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## Conventional Forces in Europe

### A New Approach to the Balance, Stability, and Arms Control

Laurinda L. Rohn

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The research described in this report was sponsored jointly by the Under Secretary of Defense for Policy within RAND's National Defense Research Institute, a federally funded research and development center supported by the Office of the Secretary of Defense and the Joint Chiefs of Staff under Contract No. MDA903-85-C-0030; and by the United States Air Force under Contract F49620-86-C-0008.

**Library of Congress Cataloging in Publication Data**

Rohn, Laurinda L.

Conventional forces in Europe : a new approach to the balance, stability, and arms control / Laurinda L. Rohn ; prepared for the Office of the Under Secretary of Defense for Policy and the United States Air Force.

p. cm.

"May 1990."

"R-3732-USDP/AF."

ISBN 0-8330-0687-8

1. Europe—Armed Forces. 2. Europe—Defenses. 3. Arms control.

I. RAND Corporation. II. Title.

UA646.R63 1989

355'.03304—dc20

89-27318

CIP

The RAND Publication Series: The Report is the principal publication documenting and transmitting RAND's major research findings and final research results. The RAND Note reports other outputs of sponsored research for general distribution. Publications of The RAND Corporation do not necessarily reflect the opinions or policies of the sponsors of RAND research.

Published by The RAND Corporation  
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90406-2138

R-3732-USDP/AF

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## **PREFACE**

The development of a framework in which to study the conventional balance and conventional stability in Europe was undertaken as a dissertation in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Public Policy Analysis from the RAND Graduate School. This analysis has been prepared for the Under Secretary of Defense for Policy as part of the RAND Strategy Assessment Center program in the National Defense Research Institute, an OSD-sponsored federally funded research and development center, and for the U.S. Air Force as part of RAND's National Security Strategies program within Project AIR FORCE. The data used in this analysis are from publicly available materials. The methodology and the results of its application may be of interest to analysts studying conventional forces and to individuals or organizations involved in conventional arms control and conventional defense planning.

## SUMMARY

There has recently been a resurgence of interest in the balance of conventional forces in the central European region. This increased concern is attributable to several factors, including the signing of the U.S.-Soviet INF treaty, the possibility of a "third zero" in Europe, increasing interest in a conventional arms control agreement, a perceived decrease in the credibility of the threat of nuclear use, and a trend away from considering escalation to nuclear use as the inevitable result of a conventional war.

The "balance (or imbalance) of conventional forces" is an expression of the degree to which the capabilities of the conventional military forces deployed by two sides are in some way equal. Obviously, this balance is a central factor in determining the degree to which a given situation is stable. But "conventional stability" is a broader concept than balance; it also encompasses *perceptions* of the balance, differences in the nature of the operational tasks imposed on the forces of both sides, and other factors. Conventional stability rests on the degree to which both sides *believe they could achieve their military objectives* in wartime.

The debate surrounding the conventional balance is somewhat confused. There are many different balance assessment techniques used in analysis. Inadequate attention is given to the concept of stability in the conventional realm. Although conventional force planning, arms control policy, and defense objectives should be inextricably entwined, there appears to be very little connection between them.

This report suggests a concept of conventional stability. Conventional stability exists when there is a balance of conventional capabilities such that **both sides believe that neither side can launch a successful attack against the other, and either side can successfully repel any attack launched by the other.** This definition suggests two facets of conventional stability, one based on offense and one based on defense. Offensive conventional stability would exist if neither side believed it could successfully attack the other, that neither could achieve its military objectives if it were to attack. Defensive conventional stability would exist if each side believed it could repel any attack launched by the other side.

Several kinds of techniques are available for assessing the conventional balance. The advantages and disadvantages of each are summarized in Table S.1. Dynamic computer simulations are probably the most useful for judging progress toward conventional stability.

Table S.1  
SUMMARY COMPARISON OF BALANCE ASSESSMENT METHODOLOGIES

Category of Methodology	Advantages	Disadvantages
Static Counts	<ul style="list-style-type: none"> <li>Are easy to do</li> <li>Are easily usable for sensitivity analysis</li> <li>Are transparent</li> <li>Are very common</li> <li>Are primary basis for denominating arms control agreements</li> <li>Can be useful for making resource allocation decisions</li> </ul>	<ul style="list-style-type: none"> <li>Do not predict combat outcomes</li> <li>Do not account for quality of systems</li> <li>Ignore combat phenomena</li> <li>Do not consider changes in number of available forces because of mobilization and conflict</li> <li>Can be misleading</li> </ul>
Weighted Static Counts	<ul style="list-style-type: none"> <li>Consider quality and quantity of systems</li> <li>Provide a common measure for comparing different kinds of forces</li> <li>Are easily usable for sensitivity analysis</li> </ul>	<ul style="list-style-type: none"> <li>Do not predict combat outcomes</li> <li>Ignore combat phenomena</li> <li>Do not consider changes in number of available forces because of mobilization and conflict</li> <li>Are somewhat less straightforward than static counts</li> <li>Can include questionable assumptions about relative worth and quality of weapons</li> <li>Often ignore combined arms effects and different effectiveness of units in different situations</li> </ul>
Buildup Rate Techniques	<ul style="list-style-type: none"> <li>Consider how numbers change because of mobilization</li> <li>Are well-suited for sensitivity analysis</li> <li>Can be done for weapons, units, or manpower</li> </ul>	<ul style="list-style-type: none"> <li>Do not predict combat outcomes</li> <li>Ignore combat phenomena</li> <li>Do not consider changes in number of available forces because of mobilization and conflict</li> <li>Can include questionable assumptions about mobilization rates</li> </ul>

Table S.1—continued

Category of Methodology	Advantages	Disadvantages
Dynamic Techniques Equation-based models	Predict combat outcomes Consider changes to forces over time Usually lend themselves well to sensitivity analysis	Often ignore important combat phenomena Generate outcomes that frequently do not agree with historical reality Include assumptions that are often difficult to determine
Computer simulations	Predict many types of combat outcomes Consider changes to forces over time Are good for sensitivity analysis (if built properly) Can account for many combat phenomena Can use adaptive tactics	Are very complex with many assumptions and parameters Many sources of variation and error Can be difficult to explain Cannot replicate human behavior
Human-played war games	Can replicate uncertainties inherent in combat situations Can replicate human behavior Include effects of nonquantifiable phenomena Consider changes in forces over time	Are not reproducible Are not usable for sensitivity analysis Are only games, and players know that Can lack transparency regarding decision processes

This report suggests a new analytic framework relating measurements of military capabilities, balance assessment methodologies, and defense objectives to conventional stability. The framework presents an assessment of the balance (e.g., a combat outcome such as territory lost or attrition, or the number of forces available after a certain time) as a function of the two sides' military capabilities. These measures are determined using some type of assessment methodology, and they can take into account the two sides' perceptions of their own and their opponent's capabilities. Areas of conventional stability can be shown graphically using these measures. These areas will be larger, smaller, or perhaps nonexistent, depending on the capabilities, perceptions, and military objectives of each side.

The framework allows changes in force capabilities, whether due to arms control proposals or to force improvements, to be assessed in terms of their effect on conventional stability. The framework can be used to examine these effects under a range of scenario assumptions. It offers an analytic methodology that can relate force planning, arms control policy, and defense objectives.

Application of the framework to the conventional balance in Europe suggests some tentative conclusions regarding the potential role of arms control in stabilizing the balance: **The most productive use of arms control seems to be to decrease the offensive potential of the two sides' forces.** Limitations on the size of the forces should receive secondary emphasis. After both sides reach a more defensive posture, it might be possible to reduce mutually *and* to maintain or strengthen conventional stability. This analysis suggests that agreeing on mutual force reductions without first decreasing the offensive potential of the forces will not create a conventionally stable situation and could make NATO worse off with respect to its ability to achieve its defense objectives.



## ACKNOWLEDGMENTS

The process of formulating and completing a dissertation is seldom an easy one; however, many people contributed advice, assistance, and support that made the exercise a rewarding one. James Thomson, my committee chairman, gave me the original idea for the dissertation and helped in refining it. He and committee members Richard Darilek and Kenneth Solomon provided timely guidance and constructive criticism and were generally the best committee a person could hope for. Robert Nurick's guidance and comments were also much appreciated.

Discussions with many RAND colleagues, including Patrick Allen, Nanette Gantz, Robert Howe, and Philip Romero, helped to clarify ideas and to refine concepts. Richard Kugler and David Ochmanek provided thorough and thoughtful reviews and suggestions for improvements.

Laurie Rennie's secretarial support throughout the process was greatly appreciated as was the invaluable research assistance of Lilita Dzirkals and RAND's library staff.

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## ABBREVIATIONS

ABM	Anti-ballistic missile
ADE	Armored division equivalent
AFCENT	Allied Forces Central Europe
C3I	Command, control, communications and intelligence
CBO	Congressional Budget Office
CENTAG	Central Army Group
CFE	Conventional Forces in Europe
CSCE	Conference on Security and Co-operation in Europe
CST	Conventional Stability Talks
DoD	Department of Defense
FBIS	Foreign Broadcast Information Service
FEBA	Forward edge of battle area
FOFA	Follow-On Forces Attack
FRG	Federal Republic of Germany (West Germany)
GDR	German Democratic Republic (East Germany)
HDE	Heavy division equivalent
IGB	Inter-German border
IISS	International Institute for Strategic Studies
INF	Intermediate-range nuclear forces
JPRS	Joint Publications Research Service
MBFR	Mutual and Balanced Force Reductions
MOE	Measure of effectiveness
NATO	North Atlantic Treaty Organization
NORTHAG	Northern Army Group
NSWP	Non-Soviet Warsaw Pact
PCC	Political Consultative Committee
POMCUS	Prepositioned overseas materiel configured in unit sets
SACEUR	Supreme Allied Commander Europe
SALT	Strategic Arms Limitation Talks
TVD	Theater of military operations (Russian <i>teatr voyennykh deystviy</i> )
WEI	Weapon effectiveness index
WP	Warsaw Pact
WPDMC	Warsaw Pact Defense Ministers Committee
WTO	Warsaw Treaty Organization
WUV	Weighted unit value

## GLOSSARY

*Atlantic to the Urals.* This region includes Belgium, Denmark, the Federal Republic of Germany, France, Greece, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, most of Turkey, and the United Kingdom on the NATO side. Warsaw Pact countries included are Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Poland, Romania, and the area of the Soviet Union west of the Ural mountains (the Baltic, Belorussian, Carpathian, Kiev, Leningrad, Moscow, North Caucasus, Odessa, Trans Caucasus, Ural, and Volga military districts).

*Inter-German Border.* The border between the two Germanies and between West Germany and Czechoslovakia.

*NATO.* The sixteen members of the NATO alliance are Belgium, Canada, Denmark, the Federal Republic of Germany, France, Greece, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Turkey, the United Kingdom, and the United States of America.

*NATO Guidelines Area.* The NGA comprises Belgium, the Federal Republic of Germany, Luxembourg, and the Netherlands on the NATO side, and Czechoslovakia, the German Democratic Republic, and Poland on the Pact side.

*Warsaw Pact.* The seven nations of the Warsaw Pact alliance are Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Poland, Romania, and the Union of Soviet Socialist Republics. The terms "Warsaw Pact" and "Warsaw Treaty Organization" are used interchangeably as are the abbreviations "Pact" and "WTO."

## I. INTRODUCTION

The past 40 years have seen quite a bit of thought devoted to nuclear force issues such as the balance, stability, and deterrence. The amount of attention given these same topics in the realm of conventional forces has waxed and waned but has not approached that given nuclear force issues. This situation is changing. There has recently been a resurgence of interest in conventional forces, particularly in the central European region.<sup>1</sup> The North Atlantic Council has stated that the conventional situation in Europe "remains at the core of Europe's security concerns."<sup>2</sup>

The "balance (or imbalance) of conventional forces" is an expression of the degree to which the capabilities of the conventional military forces deployed by two sides are, in some way, equal. Obviously, this balance is a central factor in determining the degree to which a given situation is stable. But "conventional stability" is a broader concept than balance; it also encompasses *perceptions* of the balance, differences in the nature of the operational tasks imposed on the forces of both sides, and other factors. In short, conventional stability rests on the degree to which both sides *believe they could achieve their military objectives* in wartime.

### THE INCREASING IMPORTANCE OF THE CONVENTIONAL BALANCE

The conventional force balance in Europe between the North Atlantic Treaty Organization (NATO) and the Warsaw Pact is clearly a matter of increasing concern to both sides. Several factors account for the renewed interest in this issue. One is the recent signing of the U.S.-Soviet treaty that bans intermediate- and shorter-range nuclear missiles (commonly referred to as the INF treaty). Although the treaty does not remove all nuclear weapons from Europe, it has forced the correlation of conventional forces in the area into the limelight and has brought the issues surrounding the conventional balance to the fore

---

<sup>1</sup>An interesting though unscientific indicator of this phenomenon is the number of articles published in the journal *International Security* dealing with the NATO-Warsaw Pact conventional balance in central Europe. In the ten issues between the fall of 1985 and the winter of 1987-1988, no articles dealing with this topic were published. In the spring, summer, and fall issues of 1988, nine such articles were included.

<sup>2</sup>North Atlantic Council, 1988, p. 32.



within both the Warsaw Pact<sup>3</sup> and NATO analytic communities. Furthermore, the concept of eliminating tactical nuclear weapons from Europe as well (the so-called "third zero" option) is receiving some public support in the West.<sup>4</sup> There is public pressure to reduce, and even to eliminate, the role and presence of nuclear weapons in Western defenses, a phenomenon that has been dubbed the "nuclear allergy." Simultaneously, however, the possible elimination of nuclear weapons from the area has elicited concern that Europe might be made "safe for conventional war" again. Record and Rivkin note that critics of the INF treaty "contend that any degree of denuclearization of Europe not tied in some way to a redress of the conventional military balance, which continues to favor the Soviet Union, could make Europe safe for conventional warfare on a scale not witnessed since 1945."<sup>5</sup> What the state of the conventional balance in Europe really is and what can be done to improve conventional defenses have thus become very hot topics. Regardless of whether the INF treaty has made the situation in Europe more or less stable, it has certainly focused attention on conventional forces.

Another reason for concern about the conventional balance is the increased interest in a conventional arms control agreement. Many see a treaty reducing and limiting conventional forces as a logical follow-on to the INF treaty.<sup>6</sup> The Pact is generally perceived in the West as possessing conventional superiority in Europe,<sup>7</sup> and NATO is interested in rectifying the problem. A substantial quantitative buildup of NATO conventional forces to offset this perceived superiority is highly unlikely given the current economic, political, and demographic environments. Western democracies are loath to increase their defense spending to the extent that would be required for such a buildup, and the draftable segment of the population in many NATO countries is declining.<sup>8</sup> Conventional arms control is seen as one way to limit the

<sup>3</sup>See, for example, Kokoshin, 1987, p. 3; Tatarnikov, 1988.

<sup>4</sup>Dean, 1988, p. 71.

<sup>5</sup>Record and Rivkin, 1988, p. 735.

<sup>6</sup>There are ongoing talks to limit conventional forces in Europe. The Conventional Forces in Europe (CFE) negotiations began in March 1989. The Mutual and Balanced Force Reduction (MBFR) talks, which began in October 1973, concentrated on reductions in military manpower in Europe. These negotiations concluded without an agreement in February 1989.

<sup>7</sup>The issue of perceptions of the conventional balance in Europe receives extended treatment in Sec. II.

<sup>8</sup>Hamilton, 1985, p. 133. NATO might not be alone in its demographic bind. There is some evidence that the Soviet Union might also have trouble in the future manning both its military forces and its civilian sector. Van Oudenaren, 1988, p. 54. However, Ellen Jones points out that the Soviet draft-age cohort probably bottomed out in 1988 and will now rise slowly. Jones, 1985, p. 58.

Pact's buildup and to limit and perhaps even to decrease conventional defense expenditures on both sides.

A decrease in the perceived utility of nuclear weapons has also increased the importance of the conventional balance. That nuclear weapons might not be useful as a means of defense has been suggested,<sup>9</sup> but the primary reason cited for the decrease in utility is the reduced credibility of the threat of nuclear use. The North Atlantic Assembly's Military Committee states that as "doubts about the moral legitimacy and military utility of the threat of first use of nuclear weapons have grown, so has the interest in reducing NATO's reliance on nuclear weapons through improving non-nuclear forces."<sup>10</sup> The advent of nuclear parity, several analysts argue, has made the conventional balance much more important<sup>11</sup> and has reduced the credibility of the threat of escalation to nuclear use.<sup>12</sup> If the use of nuclear weapons ceases to be perceived as probable, reliance on conventional forces as the means of deterrence, and thus the importance of the conventional force balance, increases considerably.

It is becoming more likely that any war fought in Europe would be fought strictly with conventional weapons. Healey states that the "trend toward the non-nuclear defense of Western Europe is now well established."<sup>13</sup> The Soviets also recognize this trend. "Throughout the 1980s, in fact, more and more Soviet military spokesmen have warned that the Western threat consists primarily in an all-conventional conflict, in which major strategic operations are successfully conducted within one or more TVDs<sup>14</sup> without recourse to nuclear weapons."<sup>15</sup> There appears to be a trend in Soviet doctrine away from considering escalation to nuclear use as inevitable. Ross points out that Soviet "expectations about the inevitability of escalation from non-nuclear to nuclear warfare have been modified. A clear-cut preference for extending the non-nuclear phase of conflict—and perhaps even keeping theatre wars 'conventional'—has emerged."<sup>16</sup>

<sup>9</sup>Mearsheimer suggests that although nuclear weapons will continue to have some deterrent value by virtue of the possibility of their use, there is a "growing acceptance of the disutility of nuclear weapons for purposes of defense." See Mearsheimer, 1983, p. 13.

<sup>10</sup>North Atlantic Assembly, 1984b, p. 1.

<sup>11</sup>See, for example, Karber, 1984, p. 27; and Biddle, 1988, p. 99.

<sup>12</sup>Thomson, 1986, p. 3.

<sup>13</sup>Healey, 1987, p. 722.

<sup>14</sup>TVD is the Russian acronym for theater of military operations (*teatr voyennykh deystviy*).

<sup>15</sup>FitzGerald, 1987, p. 8.

<sup>16</sup>Ross, 1986, p. 48. MccGwire argues that this trend away from nuclear weapons is not recent but has its origins in the 1950s and 1960s. MccGwire, 1987, p. 730.

Nuclear weapons obviously still affect the military balance in Europe; however, their role seems to be decreasing. Although escalation to nuclear use is still possible as long as nuclear weapons exist, such escalation is no longer seen as the inevitable result of conventional war. It is therefore important not only to study conventional force issues but also to study them independently of nuclear force issues. This can best be done in an environment where the conventional balance and conventional stability are given careful analytic consideration.

### PROBLEMS WITH THE DEBATE

The debate surrounding the conventional balance is, as Biddle says, "crucial but confused."<sup>17</sup> One of the problems with the current state of this debate is that many different techniques are used to assess the balance. Some compare numbers of weapons or combat units in a particular geographic area. Others measure the numbers of weapons or combat units available at various points in time. Still others simulate conflicts, determining the results of those conflicts with mathematical equations and computer-based models. Some techniques consider how the situation would change as time progresses, but some do not. These various techniques generate different assessments of the balance. Comparing the results of different assessment methodologies and determining how changes in assumptions affect those results can be difficult and confusing.

The current debate also gives inadequate consideration to the concept of conventional stability. Stability receives a lot of attention in the nuclear realm. Overall force postures and the nuclear balance are assessed according to whether they are stable or unstable. Stability receives much less attention in the conventional realm; however, it is no less important. An overall concept of conventional stability is necessary if the situation in Europe is to be improved. Some consideration is being given to which conventional weapons and aspects of doctrine are destabilizing; but the term "stability" is frequently used without being defined, or it is misused. The term "destabilizing" often means "anything we don't like." Parity in numbers is frequently assumed, without justification, to be better and therefore "stabilizing." Many assume that any arms control agreement that decreases numbers of weapons is automatically "stabilizing," again without justification.

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<sup>17</sup>Biddle, 1988, p. 99.

A third major problem with the current state of the debate over conventional forces is the lack of an obvious connection among force planning, arms control policy, and defense objectives. These three issues are inextricably entwined, and policymakers should consider them jointly. Forces should be planned that will help to achieve defense objectives. Arms control proposals should be accepted only when they will drive a side no further from its defense objectives. Once accepted, arms control proposals limit some forces and therefore change force planning. This relationship seems both obvious and inescapable. Yet the connection between NATO's defense planning, its arms control policy, and its defense objectives is at best tenuous. Thomson and Gantz note the absence of this linkage and point out that it is difficult to establish partly because of institutional problems but also because of "the lack of a unifying framework by which outcomes in both [conventional arms control policy and conventional defense policy] can be assessed."<sup>18</sup> A related problem is NATO's lack of a clear and universally accepted objective. The North Atlantic Assembly's Military Committee says that NATO's conventional force planning "is hampered by lack of an agreed understanding of desired ends. . . . [There] must be a clearer understanding than now is the case of what it is that we want to accomplish, and what criteria are relevant in measuring progress towards that end."<sup>19</sup> Former U.S. ambassador to the MBFR negotiations Jonathan Dean says, "NATO cannot have an effective negotiating strategy for these new [arms control] talks without having a seriously held long-range objective."<sup>20</sup> A definite objective is necessary to link force planning and arms control policy.

If the quality of the debate surrounding conventional force issues is to improve, a context unifying the various assessment methodologies and assumptions and a concept of conventional stability is required. Such a framework should allow comparison of the results of different techniques and assessment of the effects of arms control and force improvement proposals on defense objectives.

## A CONCEPT OF CONVENTIONAL STABILITY

Although the term "stability" is often used, it is infrequently defined. Both sides have agreed that the primary purpose of the Con-

<sup>18</sup>Thomson and Gantz, 1987, p. 1.

<sup>19</sup>North Atlantic Assembly, 1984b, p. 3.

<sup>20</sup>Dean, 1988, p. 72.

ventional Forces in Europe talks is to enhance stability in Europe.<sup>21</sup> It is therefore necessary to define what is being enhanced. Rühl suggests the following definition.

*Military stability* is defined here as a situation where two or more antagonists have a balance of forces allowing either side to deny the other an essential interference with its own security interests. This military stability is enhanced politically if all sides concede to the other an equal measure of security from external threats or if they even renounce any offensive capabilities (*political stability*).<sup>22</sup>

Under these definitions, political stability is dependent upon the intentions and perceived security interests of the two sides, whereas military stability is dependent upon the military capabilities of the two sides. Countries are therefore more concerned with the intentions and military capabilities of countries whose security interests conflict with their own. Although perceived security interests can change in the long term, they tend to be stable in the short term. However, as Wörner notes, intentions can change overnight; stability must therefore depend on the balance of military capabilities.<sup>23</sup> His point is valid. This is not to say that intentions are meaningless. Certainly, war is less likely if no one wants to fight. Nevertheless, political intentions can change much more quickly than military capabilities can. Intentions can reinforce stability but should not be its basis. Therefore, the focus herein will be on military capabilities and stability and, more specifically, on conventional stability.

Rühl suggests that conventional stability is "a status of balance of conventional options where either side can effectively repel any potential aggressor."<sup>24</sup> This definition is a good beginning. One point must be added, though. Not only must either side be able to repel any aggressor, but both sides must also perceive that either side can repel any aggressor. This distinction is not trivial. It is really the perceptions about relative military capabilities rather than the forces' capabilities themselves that are important. These perceptions substantially influence the assessment of the costs, risks, and gains of going to war, which is the basis of deterrence. Although it is the forces that would fight, it is the perceptions that underlie deterrence. With this in mind, the following definition of conventional stability is proposed.

<sup>21</sup>Hirschfeld, 1988, p. 13; and Tatarnikov as quoted in "West's Reaction Awaited to Proposals on Conventional and Dual-Purpose Arms," *Tass*, January 30, 1988, in *Summary of World Broadcasts*, The British Broadcasting Corporation, February 3, 1988, p. SU/0065/A1/1.

<sup>22</sup>Rühl, 1988, p. 38. Italics in original.

<sup>23</sup>Wörner, 1988, p. 105.

<sup>24</sup>Rühl, 1988, p. 38.

Conventional stability exists when there is a balance of conventional capabilities such that both sides believe that (1) neither side can launch a successful attack against the other, and (2) either side can successfully repel any attack launched by the other.

This definition suggests two facets of conventional stability, one based on offense and one based on defense.

Offensive conventional stability would exist if neither side believed it could successfully attack the other—that is, it could not achieve its military objectives if it were to attack. Each side would assess the results of a postulated conflict assuming that it attacked the other side. If neither side believed that its attack would be successful, the situation would be offensively stable.

Defensive conventional stability would exist if each side believed it could repel any attack launched by the other side. Each side would assess the results of a postulated conflict assuming that it was attacked by the other side. If each side believed that it could successfully defend, the situation would be defensively stable.

## A NEW APPROACH

This report suggests a new approach to analysis of the conventional balance and stability in Europe based upon the above definition. This approach can improve the treatment of the conventional balance in two critical ways. First, it provides a context in which to relate balance assessments and stability. The suggested framework can tie together different techniques used to assess the conventional balance and can provide a common metric with which to judge the effects of changes in the balance.

Second, the proposed framework can be used to link force structure planning and defense objectives and to evaluate arms control proposals. Force structures and postures can be changed within the framework according to arms control or force improvement proposals, and the effects of those changes on defense objectives can be assessed. This provides a mechanism for assessing how arms control proposals could affect security and stability and how changes in force structure could affect defense objectives.

The suggested new approach to assessing the conventional balance and stability utilizes some of the existing methodologies that the NATO community uses to assess the European conventional balance. Section II describes some of these methods and discusses the uncertainties, advantages, and disadvantages associated with them. Factors that are perceived as destabilizing to the conventional situation are

also discussed. Some possible objectives and measures of effectiveness for NATO's defense capabilities are considered. Section III presents similar issues for the Warsaw Pact. Section IV introduces the new framework and applies it to the current situation in Central Europe. Section V presents some conclusions and suggests some possibilities for future research.

## **II. THE CONVENTIONAL BALANCE AND STABILITY IN EUROPE—THE NATO PERSPECTIVE**

The first part of this section describes some of the methods used in the NATO community to evaluate the conventional balance in Europe. Perceptions of the balance are discussed in the second section. The third section considers which Warsaw Pact capabilities are perceived as destabilizing to the conventional situation in Europe and what would be considered stabilizing to that situation. The last section discusses some possible conventional defense objectives for NATO and some measures of effectiveness for those objectives.

### **METHODS OF EVALUATING THE CONVENTIONAL BALANCE**

Assessments of the conventional balance in Europe are nearly as numerous as the analysts who study the balance. The plethora of assessment techniques and the arguments over methodology do little to clarify the situation. This section will briefly review some of the more common methods.

Quantitative balance assessments can be divided into four categories: static counts, weighted static counts, buildup rate assessments, and dynamic assessments.<sup>1</sup>

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<sup>1</sup>This categorization is a slightly modified version of the one found in Shishko, 1981, p. 3.

There are many ways to categorize balance analysis techniques. The categorization used here is based on the type of technique. Other categorizations could be based, for example, on the functional purpose of the analysis. One possible taxonomy, suggested by RAND colleague Richard Kugler, would divide techniques as follows:

- Buildup rate analysis. Determines how many forces each side can deploy to the battlefield over time.
- Capability analysis. Assesses the combat strength of forces on the battlefield.
- Requirements analysis. Estimates how many forces are needed to execute a defensive or offensive strategy.
- Investment analysis. Decides what improvements to make in order to move capabilities closer to requirements.

Some methodologies might fall into more than one of these categories. The assessment methodologies discussed below are primarily of the first two types.



### Static Counts

Static counts, also known as "bean counts," are the most commonly used method of assessing the conventional balance. Static counts answer the question "who has more?" Anything that can be counted can be used in a static count comparison. Some commonly compared items are tanks, artillery, manpower, divisions, aircraft, and defense budgets. Figure 1 compares static tank counts, and Fig. 2 static artillery counts, from two sources. Table 1 shows static assessments for several weapon categories.

There are two different kinds of static count comparisons. One kind compares like systems—for example, the numbers of U.S. and Soviet tanks. Another type compares what could be called opposing systems—for example, Pact tanks and NATO antitank weapons. The first type of comparison is the more prevalent. The second kind of comparison is justified on the grounds that comparing like systems is not always useful. Comparing numbers of anti-aircraft weapons on

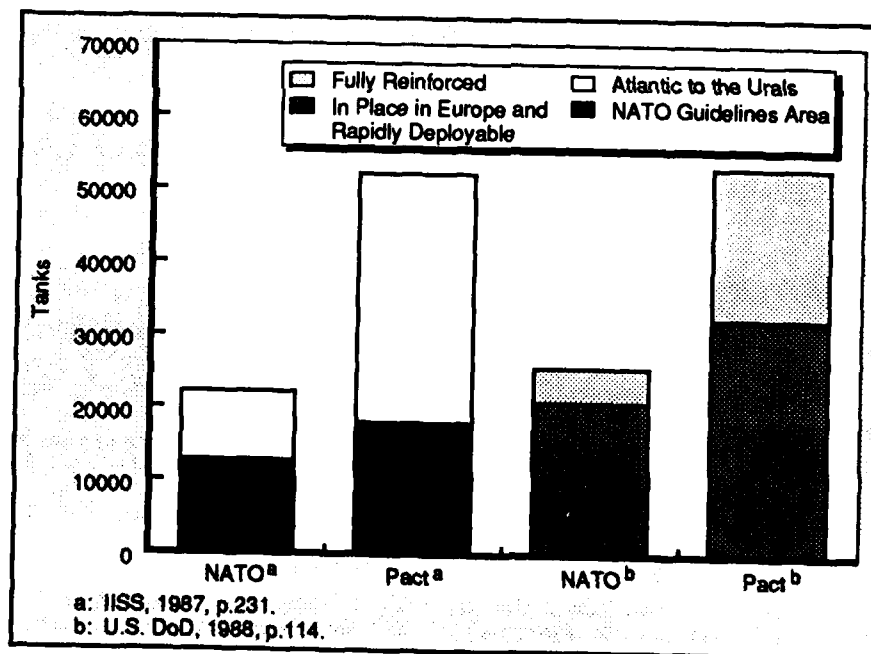


Fig. 1—The European tank balance

each side, for example, might not be a particularly useful exercise because most anti-aircraft weapons do not shoot at each other, they shoot at aircraft. It is argued, therefore, that a better comparison would be the number of anti-aircraft weapons on one side versus the number of aircraft on the other side. These kinds of comparisons can become troublesome, however, because most weapon systems are used against many different targets.

**Uncertainties.** Although static counts are clearly the simplest kind of balance assessment, some uncertainties are involved. First, one must decide how to define what is being counted. At first consideration, this might seem to be a nonproblem. However, upon closer examination, a number of questions are raised. What, for example, is a tank? The answer to this question is not necessarily simple. Do all tanks have treads? Conversely, is anything with treads a tank? What exactly is the difference between a tank and an armored personnel carrier? Is anything with armor and a gun a tank? Do all tanks have turrets? These are just some of the questions that need to be answered

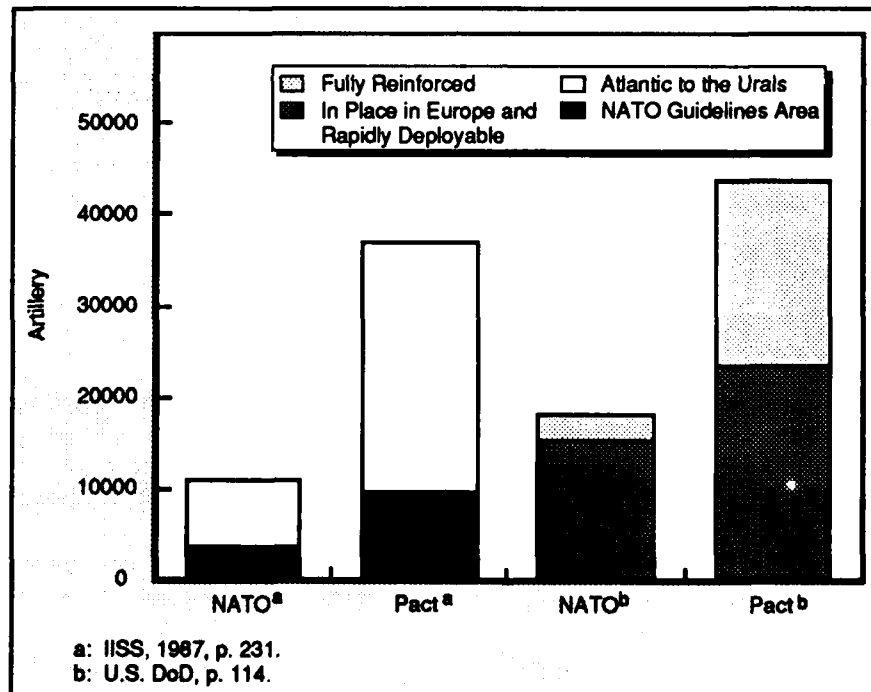


Fig. 2—The European artillery balance

Table 1

## NATO STATIC BALANCE ASSESSMENT, ATLANTIC-TO-THE-URALS REGION

	Pact	NATO <sup>a</sup>	Pact:NATO Ratio
Divisions			
Peacetime manned	101½	107½	0.94:1
Total mobilized	201½	149	1.35:1
Personnel			
Active ground	2,292,000	2,385,000	0.96:1
Reserve ground	4,276,000	4,371,000	0.98:1
Artillery	37,000	11,100	3.33:1
Tanks	52,200	22,200	2.35:1
Anti-tank weapons			
Ground-based	16,600	10,100	1.64:1
On helicopters	1,050	470	2.23:1
Aircraft			
Bombers	450	285	1.58:1
Attack	2,144	2,108	1.02:1
Interceptors/ fighters	4,930	899	5.48:1
Armed helicopters	1,630	780	2.09:1

SOURCE: IISS, 1987, p. 231.

<sup>a</sup>French and Spanish forces are not part of NATO's integrated military command but are included insofar as they are deployed in the relevant geographical area.

for every type of weapon system. There are also questions regarding how to count systems that can be used with either conventional or nuclear munitions (so-called "dual-capable" systems). For example, should dual-capable artillery be counted solely as a conventional weapon or as a nuclear weapon? Because the system can be used either way, this probably does not make sense. Should such systems be counted twice, as both nuclear and conventional? This might not be considered fair, particularly if one side has more dual-capable systems than the other side but fewer weapons overall. Should some fraction be counted as nuclear and the remainder as conventional? If so, what fraction?

A second source of uncertainty in static counts arises when one determines whose forces are to be included in the tally. Should NATO

figures include French forces? Although French forces are technically not under NATO's command, the French have said that they will assist in the defense of Europe in the face of a Warsaw Pact invasion. Some, however, remain uncertain about the degree of French commitment. If the French are included in NATO's count, should only those French forces stationed in the Federal Republic of Germany (FRG) be counted, or should the forces stationed in France be included as well? Forces stationed in France might be sent to the FRG to help the defense, or they might be held back to defend France itself. There are also questions about which U.S. forces should be counted. Should U.S. forces based in the United States be counted, or just the ones based in Europe? Some U.S. forces have duplicates of most of their equipment stored in Europe<sup>2</sup> and are designated to go to Europe quickly if NATO is threatened with a Pact invasion. Those forces are usually included in balance assessments. Other U.S. forces based in the United States are designated to go to Europe but will have to take all of their equipment with them and will thus take more time to get there. Should these forces be included? They might not get to Europe at all if there are problems with their airlift or sealift; and if they do arrive, it might be too late for them to affect the outcome of the conflict. However, if the period of mobilization is long, these forces might arrive in time and would be very important. But what about other U.S. forces that, although not specifically designated to go to Europe, would probably be sent to Europe if there were no crises in other parts of the world? They might go to Europe, but then again they might not. If an assessment of the balance along NATO's central front is being conducted, should Soviet forces in Hungary be included? Some analysts say that these forces would remain in Hungary to maintain order along the Warsaw Pact's southern flank or to be used against Italy. But some say that they would probably be sent to central Europe if an invasion were imminent. What about Soviet forces in the western military districts of the Soviet Union? Although these forces are not directly opposite NATO territory, they would probably be sent to reinforce an invasion of West Germany. Should they be counted? Although forces in the rest of the Soviet Union might not be directly committed to reinforce an invasion of NATO territory, the Soviets might choose to send them to assist in central Europe, particularly if the war turned out to be a long one. Should they be included as well?

Another consideration is what kinds of forces to count. Not all divisions, for example, are equally ready to fight in a war. Some, like the

<sup>2</sup>These are commonly referred to as POMCUS (prepositioned overseas materiel configured in unit sets) forces.

U.S. divisions stationed in the FRG, are kept ready for combat. Clearly, forces that can be ready to fight within a few days should be included in any counts. If the war continues a week or two, forces that take that long to get ready would have an effect. But what about units that would take a month or perhaps even two or three months to be ready to enter combat? Should they be counted along with the more ready units? Or should a separate category be set up for them? Or is the war expected to be so short that they would not even arrive before the end of combat? Perhaps they should not be counted at all?

The above are only some of the questions that would need to be addressed before a useful static count assessment could be done. Many of these questions have already been answered in various ways; however, there is often no single "right" answer. In general, these uncertainties are manageable. But the questions must be addressed, the decisions made, and the assumptions made explicit before the assessment is done.

**Advantages.** Static count comparisons are easy to do. Counts of manpower and weapon inventories are readily available at an unclassified level from many sources.<sup>3</sup> It is also easy to change assumptions, redo the assessment, and see how the change of assumptions alters the results. Sensitivity analyses are therefore not extremely time-consuming or difficult.

Another major advantage is that static count comparisons are fairly straightforward and are easily understood by nonanalysts and by people who are not particularly knowledgeable about conventional forces. Perhaps the best evidence for this is the frequency of appearance of static count comparisons in newspaper and news magazine articles. The average person can easily grasp the concept of a tank and the idea that country X has two or three times as many of them as country Y.

Another advantage is the commonality of static count comparisons. Many analysts in many countries use them or have done them, and they are a good "common ground" on which to base further analyses. Static counts are frequently the bases of arms control agreements and are often the measures of compliance for those agreements. They can be very useful for considering resource allocation questions, and they affect how the conventional balance is perceived and how the West responds to attempted coercion by the Pact.<sup>4</sup>

**Disadvantages.** Static count comparisons measure the inputs to a conflict, but they do not associate those inputs with combat outcomes.

<sup>3</sup>One of the most widely used sources for static counts is *The Military Balance*, which is put out annually by the International Institute for Strategic Studies (IISS). Other sources frequently cited are a U.S. Department of Defense (DoD) annual publication *Soviet Military Power*, and Collins, 1985.

<sup>4</sup>Warner and Ochmanek, 1989, p. 105.

It is fine to say that one side has twice as many tanks as the other side. But what would that mean should combat actually occur? Historically, the side with more forces has not always won.<sup>5</sup> The numerically superior French, for example, were soundly defeated by the Germans in 1940.<sup>6</sup> Since static counts are not directly associated with outputs, it is difficult to determine how the combat outcome would change if a side's weapon inventory changed. If, for example, NATO built up its inventory so that it had the same amount of artillery as the Pact, would that alter the outcome of a battle in NATO's favor? Based on static counts, one would expect that to be the case. But would the change in outcome be significant? Static count comparisons cannot answer these questions.

Another problem with static counts is that they account for the quantity but not for the quality of weapon systems. Although quantity is important to consider when doing a balance assessment, quality is also very important. While one side might have twice as many tanks as another side, what is the result if those tanks are only half as effective? Many analysts argue that, although the Pact has a much greater quantity of weapons than NATO has, many of NATO's weapons are qualitatively superior and thus much more effective than the Pact's. Factors such as age, survivability, and technological sophistication of a weapon all affect the weapon's quality and effectiveness. In most cases, one would not want to count a 40-year-old aircraft as being as effective as a new one. But even two new aircraft of different types are not necessarily equally effective. Superior avionics, better weapons, or enhanced maneuverability might make one new aircraft substantially more effective and survivable than another. However, these considerations are not reflected in static count comparisons.

Many other factors will affect the outcome of a battle but are not accounted for by static count comparisons. Command, control, communications, and intelligence (C<sup>3</sup>I); logistics support; and battle tactics, for example, are not considered in static counts. Better C<sup>3</sup>I could enable one side to determine where and perhaps when the enemy is going to attack and to increase its defenses in that area. Better logistics support could mean the difference between receiving a steady supply of the armaments necessary to maintain a defensive line and being forced to retreat until stocks are replenished. Troop training and morale are two other factors that could make a difference in the outcome of a battle but are not considered in static count comparisons. Many analysts argue that when nonquantifiable factors are accounted

<sup>5</sup>Starry, 1978, p. 6. This point is also noted by Mearsheimer, 1982, p. 9.

<sup>6</sup>Dupuy, 1982, p. 20.

for, NATO's capabilities increase by as much as 50 percent relative to the Pact.<sup>7</sup>

Static counts by their nature do not consider what happens over time. They measure the inputs before a conflict starts but do not consider the changes in the situation as the conflict progresses. Both sides will lose forces during a war, probably at differing rates, and that will affect the outcome. Reinforcing troops and equipment will arrive at varying times, and the character of the conflict itself might change over time. Whatever one believes about the rates at which these phenomena will occur, there is no doubt that the situation will change as the war progresses. Static count assessments, however, do not capture these effects.

Some static counts can be misleading. Comparisons between the defense budgets of the two alliances and between NATO/Pact manpower, for example, are not necessarily valid indicators of military capability. Different nations have different defense strategies and priorities. One nation spending more than another on defense does not necessarily imply that the first nation's defense will be superior. Fischer draws attention to the fact that nations and alliances "do not all use resources with the same efficiency. Manpower comparisons are difficult, because a particular job may be done in some states by soldiers, in others by civilians."<sup>8</sup> Straight comparisons of military manpower might not measure all of the human resources a military structure has at its disposal.

### **Weighted Static Counts**

The primary difference between weighted static count assessments and regular static counts is that weighted static counts can consider the quality as well as the quantity of weapon systems.<sup>9</sup> Two of the many different weighted static methodologies are briefly described below.

**Firepower Scoring Methodologies.** These techniques score individual types of weapons (e.g., tanks, artillery, mortars) based on the firepower they can deliver. The indices given various weapons usually represent either the lethal area of the weapon against different types of targets (e.g. the lethal area of a gun when fired at personnel) or the

<sup>7</sup>Posen suggests that to account for C<sup>3</sup>I and logistics alone, increasing NATO's estimated capability by 50 percent is a "modest" adjustment. Posen, 1988, p. 196.

<sup>8</sup>Fischer, 1976, p. 5.

<sup>9</sup>Some analysts consider weighted static counts as a subcategory of static counts rather than as a separate category. Which way they are treated is largely irrelevant. Since they are used so frequently in the analytical community and have advantages and disadvantages distinct from those of regular static counts, weighted static counts are treated here as a separate category.

probability that the weapon would kill a tank.<sup>10</sup> Data obtained from laboratory testing of weapons are used to determine the indices. Different weapons can be compared using this figure of merit. The indices for each type of weapon can be multiplied by the number of weapons of that type in a unit to generate a combined firepower score for the unit.

**The Armored Division Equivalent (ADE) Methodology.** The U.S. Army's ADE methodology attempts to combine weighted scores for the weapons within a unit to come up with a figure of merit that compares the unit with some standard division.<sup>11</sup> To determine this score, the weapons must first be given qualitative weighting factors, called weapon effectiveness indices (WEIs). These indices are usually generated by experienced military officers and are based on the weapon's reliability, speed and maneuverability, firing speed, range, ability to survive being hit by enemy fire (survivability), and lethality against different types of targets. One weapon of each type is chosen as the standard for that type; the other weapons are evaluated relative to it and are given WEIs according to that evaluation. For example, one tank is chosen as the standard and is given a WEI of 1.0. Each other kind of tank is evaluated relative to that standard tank and is given a different WEI. After the WEIs are determined, the WEI for each kind of tank is multiplied by the number of that kind of tank to determine the total score for that kind of tank. Then the scores for each kind of tank are added together to produce a total score for all tanks in the unit. This is done for every type of weapon in the unit (tanks, artillery, rifles, etc.).

A weight for each type of weapon must also be determined. This weight is designed to measure the utility of that type of weapon relative to the other types of weapons the unit has. For example, the 1974 version of the ADE methodology gave small arms a weight of 1.1 and tanks a weight of 60.<sup>12</sup> The total WEI score for each type of weapon is then multiplied by the weight for that type of weapon. These weighted scores are added together to produce a total weighted unit value (WUV) for the unit. Each unit's WUV is then divided by the WUV for a standard U.S. armored division to produce the ADE score for the unit.

Figure 3 shows a weighted static count comparison using the ADE methodology described above.

<sup>10</sup>Congressional Budget Office, 1977, p. 57.

<sup>11</sup>The following description of the WEI/WUV/ADE methodology is taken from Mako, 1983, pp. 108-109.

<sup>12</sup>Ibid., p. 108.



**Uncertainties.** As in regular static counts, one must decide which forces to count when doing a weighted static count comparison. Also, one must consider how to account for different levels of readiness. If one unit has the same ADE or firepower score as another unit but is at a lower level of readiness, it should probably not be given the same score as the more ready unit. Whether and how to alter the scores to reflect different levels of readiness must be decided.

There are many uncertainties involving the scoring systems themselves. Although the methods used to determine firepower indices involve the use of experimental data, there are uncertainties and subjective evaluations involved in the determination and interpretation of that data.<sup>13</sup> In the ADE methodology, judgments play an important part in the determination of the relative scores for the various weapon systems, though they are the judgments of experienced military officers.<sup>14</sup> Many assumptions have to be made about the relative worth and quality of weapons, and these assumptions are sometimes questioned.<sup>15</sup> Judging the difference in effectiveness between two tanks, one of which is heavier and thus less maneuverable but better protected than another, is a difficult job. Additionally, some tanks are designed with different functions in mind, so trying to compare them using a common measure could be misleading. But assigning relative effectiveness scores comparing tanks, artillery, and anti-tank weapons would seem to be an even more questionable enterprise. How many artillery pieces is a tank worth? How many rifles equal the effectiveness of an armored personnel carrier? While these comparisons can be and are made by experienced professional military officers, the assumptions and the rationales behind the judgments are not always clear and are frequently questioned.

**Advantages.** One of the main advantages of weighted static count comparisons is that they can take the quality as well as the quantity of weapon systems into consideration. When the indices for the weapon systems are determined, the age of a system, its technological sophistication, its maneuverability, and its overall survivability can all be accounted for.

Weighted static count methodologies provide a way to compare different weapons of the same basic type. The overall effectiveness of two different types of British tanks, for instance, can be compared with a common measure such as the WEI scores of the tanks. Many of these

<sup>13</sup>Stockfisch, 1975, p. vii.

<sup>14</sup>Congressional Budget Office, 1977, p. 56.

<sup>15</sup>Posen questions, for example, the relative weights given the U.S. M1 and Soviet T72 battle tanks in the ADE methodology. Posen, 1988, p. 193.

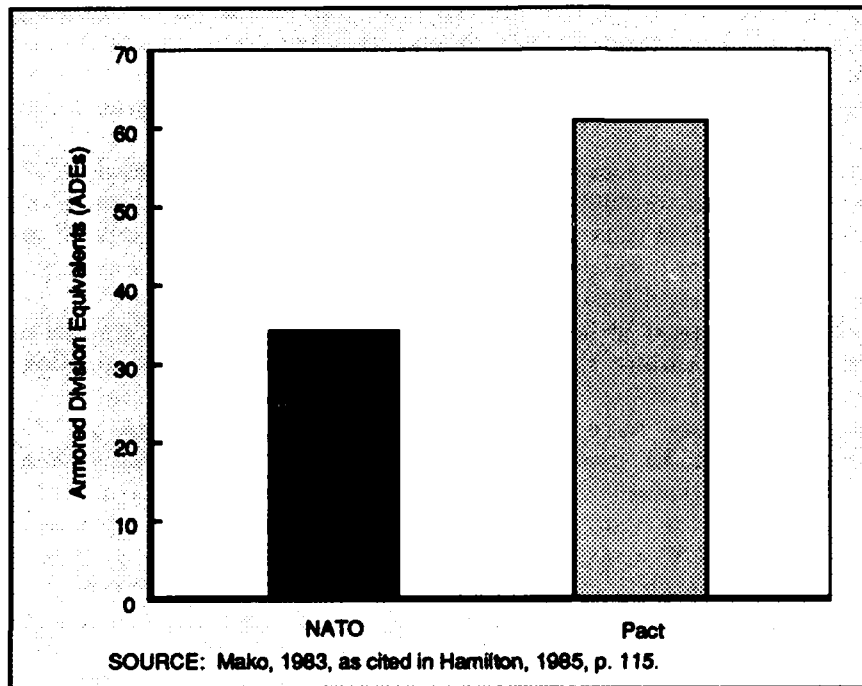


Fig. 3—Weighted static assessment  
(Forces in Europe after 30 days of mobilization)

methodologies provide combined scores for units by bringing together differing kinds of firepower and generating one measure of effectiveness for the entire unit. Some of these methods provide a common basis with which to compare entirely different types of units. Comparing divisions in central Europe, for example, can be misleading. French armored divisions differ in size and composition from U.S. armored divisions, which differ from U.S. mechanized divisions, which differ from Soviet motorized rifle divisions. A weighted score, such as an ADE or firepower score, makes it somewhat easier to try to compare the potential effectiveness of differing types and sizes of units with diverse weaponry.

**Disadvantages.** Weighted static counts suffer from some of the same problems as regular static counts. Although the former, as mentioned above, do consider the quality of the weapon systems, most do not consider other nonquantifiable factors such as tactics, C<sup>3</sup>I, and

logistics. They also do not consider personnel quality, the advantages inherent to being on the offensive or the defensive, or differing scenarios.<sup>16</sup> Like regular static counts, weighted static counts do not consider changes in the situation over time, and they measure inputs to a conflict rather than the effect those inputs have on the combat outcome.

Weighted static count comparisons are somewhat less straightforward than their unweighted counterparts. The idea of an "equivalent tank" is less clear than that of a regular tank, and the concept of an armored division equivalent is less clear still. However, these concepts are not extremely difficult to explain.

The scores used in some weighted count methodologies are static; they do not consider the situation in which the units are fighting. Combined arms effects,<sup>17</sup> for example, are often ignored. A tank force and an artillery force fighting together would, according to the weighted count, be worth the same as the two forces fighting separately. This is considered a major weakness.<sup>18</sup> Terrain effects are also often ignored. A light infantry unit, for example, always receives a lower WEI/WUV score, and thus a lower effectiveness rating, than a tank unit of the same size. The scores do not change, even if the units are fighting in very mountainous terrain, which is much more advantageous for infantry.<sup>19</sup>

### **Buildup Rate Assessments**

The buildup rate comparison is essentially either a static count or a weighted static count done at various points in time. This kind of assessment is particularly useful for determining how many tanks or ADEs or men in combat units, for example, a side will have after so many days of mobilization time. Figure 4 shows an example of a buildup rate assessment done with a weighted measure.

**Uncertainties.** Assumptions must be made regarding how ready a side's forces are in peacetime. Different Soviet divisions, for example, are kept at different levels of combat readiness. In some cases, this information is classified, but unclassified estimates can be made.

<sup>16</sup>Thomson and Gantz, 1987, p. 5.

<sup>17</sup>This concept refers to the advantages that can be gained when different types of weapons are used together, each reinforcing the other and enhancing the other's advantages. When combining arms, the whole does often become greater than the sum of its parts.

<sup>18</sup>A more detailed explanation of the shortcomings of some weighted count methodologies may be found in unpublished RAND research by Patrick Allen.

<sup>19</sup>*Ibid.*, p. 67.

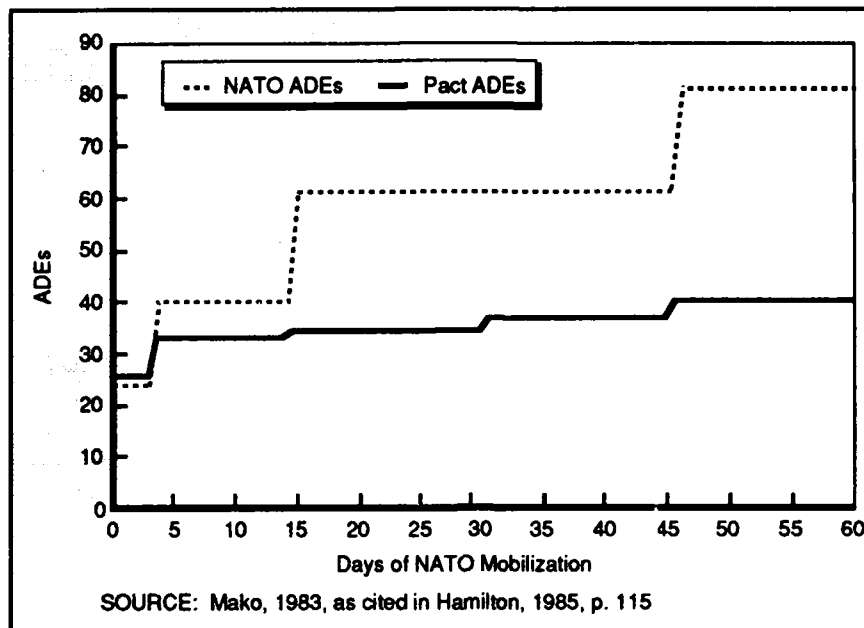


Fig. 4—Buildup rate assessment  
(NATO begins mobilizing 3 days after Pact)

However, there might be conflicting estimates, and the rationale behind how these estimates are made is not always clear.

Another set of assumptions is how quickly a side can increase the readiness of its forces. Some units might have a full complement of soldiers, but many might be new conscripts with little experience. The USSR's category II units are only 50–75 percent ready,<sup>20</sup> and U.S. National Guard and Reserve units and Soviet category III units are even less prepared.<sup>21</sup> Units that are not fully ready need to get their equipment ready, complete training of new recruits, call up reservists and possibly update their training, and pack up their equipment for transport to the front. All of these operations take time, and the estimates of the time required vary.

A third set of assumptions concerns the amount of time units require to get from their bases to the front. Fully ready units based

<sup>20</sup>IISS, 1987, p. 34.

<sup>21</sup>Kaufmann, 1983, p. 57.

close to the inter-German border (IGB) might take a day or less to arrive at their assigned defensive positions.<sup>22</sup> Units based further from the front would take correspondingly longer. Additionally, possible impediments to travel must be considered. Units traveling by surface ship convoy from the United States could be subject to attacks by Pact submarines or aircraft. NATO naval ports and airports could be destroyed by Pact deep strikes, making the unloading of reinforcements more difficult and time-consuming. Once the forces are unloaded, they must travel over land to get to the battle front, and they could again be subject to Pact air interdiction. All of these factors affect the time required for units to travel from their bases to the front.

There is quite a bit of room for disagreement on all of these issues. However, some assumptions must be made before a buildup rate balance assessment can be done, and those assumptions must be made explicit.

**Advantages.** The primary advantage of buildup rate assessments is their attention to the time element. Specific consideration is given to the availability of forces over time rather than just to the overall number of forces. These kinds of assessments are very useful for examining how the ratio of forces between the Pact and NATO changes with differing periods of mobilization. These comparisons can give analysts and planners an idea of how NATO would measure up to the Pact under various scenarios such as a "surprise" or standing-start attack, or an attack preceded by a long warning period.

Buildup rate balance assessments can be done for just about any type of force or weapon that can be counted. Although they are normally done for divisions or ADEs, these assessments can also be done for tanks, artillery, aircraft, other kinds of weapon systems, or manpower.

This type of comparison lends itself well to sensitivity analysis. It is fairly easy and also very useful to change one or more of the assumptions and determine how that changes the Pact/NATO force ratio over time. One can address a number of "what if" questions. For example, what if U.S.-based forces have only an 80 percent chance of reaching the front because of Pact submarine attacks? What would happen if NATO forces destroyed Pact railroad lines at strategic points, thus creating longer delays for Pact forces in transit? What if the U.S. procured much faster sealift for its troops? What would the effect be if Soviet category II units took twice as long as expected to get combat ready? These questions and others like them can be addressed with buildup rate balance assessments.

**Disadvantages.** Like static count balance assessments, buildup rate comparisons measure the inputs to a conflict but do not relate

<sup>22</sup>Fischer, 1976, p. 21.

those inputs to combat outcomes. Although the inputs are measured at varying points in time, they are still only the inputs. Measurement of combat inputs such as tanks, artillery, and manpower appear frequently in the conventional balance literature. One might therefore assume that such measurements are a good proxy for combat outcomes. However, as noted earlier, history does not consistently confirm this assumption.

Although buildup rate assessments do consider time and can take the quality as well as the quantity of forces into account, they still do not consider non-quantifiable factors such as tactics, C<sup>3</sup>I, and logistics support. These and other non-quantifiable factors will have important effects on the outcome of a conflict and need to be considered.

Another disadvantage is the way buildup rate assessments treat time. These kinds of comparisons do not consider how the availability of forces changes over time as a result of the battle itself. The pace of the war and the resulting attrition of forces are important factors, and buildup rate balance assessments do not treat their effects.

### **Dynamic Assessments**

The last category of tools is dynamic combat assessments. In general, dynamic assessments take a set of inputs and a set of assumptions about conflict and attempt to predict the combat outcome using those inputs and assumptions. There are dozens, quite possibly hundreds, of different dynamic models and simulations available to analysts. However, these tools can, for the most part, be grouped into three categories: equation-based models of warfare, computer-based combat simulations, and war games involving human players. Since there are many differences among these classes of assessment tools, they will be treated separately.

### **Simple Equation-Based Models**

This type of assessment determines the outcome of a conflict using mathematical equations. The equations are designed to use inputs to a conflict and various assumptions about it to determine the outcome. Some inputs used frequently are the number and quality of forces of the two sides (expressed, for example, in divisions, combat manpower, or armored division equivalents), attrition rates, and movement rates. The equations express a mathematical relationship between the inputs to a conflict and the outcomes. Possible outcomes might be the amount of territory taken by the attacker, the force ratio at the end of the war, or the length of time before one side is defeated.

Some examples of equation-based models are the Lanchester equations,<sup>23</sup> Epstein's non-Lanchesterian "Adaptive Model of War,"<sup>24</sup> and the "Attrition-FEBA Expansion Model."<sup>25</sup> Figure 5 shows an outcome from a sample case determined by Epstein's model. In this case, the outcome is the average territorial penetration by the attacker as the conflict progresses and no particular geographical area is meant.

**Uncertainties.** The primary uncertainty involved in using equations to model combat is the relation of the equation to reality. There is never certainty that the most basic parts of the model reflect reality. There is an implicit assumption in this type of assessment that says that war can be reduced to a strictly numerical phenomenon describable by a set of equations. This is, at best, an uncertain proposition. No room is left for strategy, tactics, surprise, or other nonquantifiable effects.

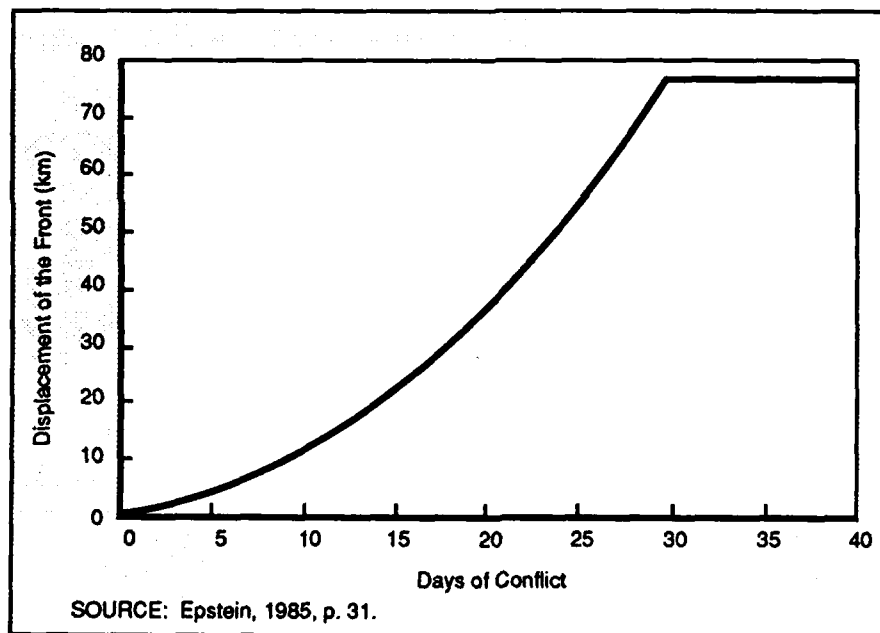


Fig. 5—Equation-based model assessment

<sup>23</sup>For an extensive treatment of Lanchester's equations, see Taylor, 1983.

<sup>24</sup>Epstein, 1985.

<sup>25</sup>Posen, 1984-85, pp. 47-88; and Posen, 1988.

Many assumptions have to be made regarding the relationships of the inputs to the combat outcomes.<sup>26</sup> The number and complexity of these assumptions depend, of course, on the complexity of the model itself. Lanchester's square law, for example, assumes that the number of forces a side has is significantly more important than the effectiveness of those forces. Using this model, if a side doubles the effectiveness of its forces without changing the number of forces, it doubles its combat power; however, if it doubles the number of forces without changing the quality of the forces, it quadruples its combat power. Clearly, the assumptions used in designing the model will affect the outputs of the model.

**Advantages.** Equation-based assessments do attempt to relate the conflict inputs to the conflict outcome. They can consider the quality as well as the quantity of forces. They also specifically treat the time element. As the conflict progresses, attrition occurs and, depending on the model, the movement rate, location of the battle, and attrition rate might also change.

Equation-based models usually lend themselves well to sensitivity analysis. Changing assumptions and input forces is (or at least should be) a straightforward process. Employing the model several times to assess the effects of the changes tends to be a fairly easy exercise, particularly if the model has been implemented on a computer.

**Disadvantages.** One major problem with simple equation-based models is that they frequently do not capture many effects that are important to the outcome of a war. Lanchester's equations, for example, assume a continuous battle between the two participants; they do not allow a defender to opt to trade space for time, nor do they penalize the defender at all for withdrawing.<sup>27</sup> Davis points out that the simple models "tend to omit many of the most important factors in actual warfare such as: maneuver phenomena; strategies employing surprise and deception; realistically imperfect decisions and behavior; and important aspects of readiness, mobilization, and sustainability."<sup>28</sup> The effects of intra-alliance coordination difficulties, surprise, advantages

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<sup>26</sup>In a recent article, Stephen Biddle describes how the assumptions inherent in dynamic models regarding the stability, neutrality, or instability of the combat process can cause models to produce wildly divergent results given minor changes in inputs. Biddle, 1988, pp. 99-121.

<sup>27</sup>For a detailed explanation of some of the major defects of Lanchester's models and other models based on Lanchester's equations, see Epstein, 1985, particularly pp. 1-13.

<sup>28</sup>Davis, 1988, p. vii.



inherent to the attacker, and possible defender problems are also usually left out.<sup>29</sup>

This type of assessment also tends not to consider important capabilities other than forces and firepower that would certainly affect the outcome of the war. C<sup>3</sup>I, logistics, use of terrain, leadership, and troop training and morale are only some of the factors often left out.

These models frequently predict outcomes that are known not to agree with reality. One study points out that by the criteria of most dynamic models, Britain and France should have easily defeated Germany in 1940.<sup>30</sup> The fit between Lanchester's predictions and historical data, for example, is less than impressive.<sup>31</sup> Dupuy suggests that there is very little fit between the historical data and the way that many models relate advance rates and attrition rates to force ratios.<sup>32</sup>

Another problem is the possible difficulty in determining what the assumptions of an equation-based model actually are. These assumptions are not always described in detail, and it can be very hard to determine what they are just by looking at the equations. This, of course, is not a disadvantage inherent to this type of assessment but rather is a function of the presentation and documentation of the model. However, the problem is not a trivial one given that many consumers of balance assessments are not necessarily mathematically inclined and might find it very difficult to determine what the assumptions are from the equations alone.

Another problem relates to how the models are used. Davis points out that simplified models can be useful

in the communication of specific concepts, but serious problems arise when simplified models used to draw broad conclusions omit many of the factors important in the phenomenon being studied. . . . Although they can be useful for some purposes, they are not a good basis for assessing the military balance—especially if one believes that maneuver phenomena are important.<sup>33</sup>

Again, this is not a disadvantage inherent to this type of model. However, care must be taken not to use models for purposes larger than their intended ones.

<sup>29</sup>Ibid., p. 6.

<sup>30</sup>Congressional Budget Office, 1977, p. 50.

<sup>31</sup>Epstein, 1985, pp. 8–10.

<sup>32</sup>Dupuy, 1987, p. 60. Although Dupuy's comments are aimed at computer models in particular, they are relevant for equation-based models as well since it is the bases of the equations he is questioning.

<sup>33</sup>Davis, 1988, p. 27.

### Detailed Computer-Based Simulations

Computer-based simulations are large and often very complex models of warfare that are implemented and used on computers. Levels of aggregation can range from considering a war as one large battle in one area, say central Europe, to specifically determining the outcomes of conflicts at the engagement or battalion levels. Many different individual models can be used in one simulation. Separate models are possible for air-to-air warfare; ground battles in different geographical areas; air-to-ground combat; and command, control, communications, and intelligence, just to name a few. The effects of weather, terrain differences, barrier defenses, differences in troop training, technological sophistication, and many other factors can be taken into account. Many inputs are required for most computer simulations, but some of the more common ones are air and ground orders of battle (which include combat units and their weapon inventories), effectiveness rates and sortie rates for aircraft and helicopters, force mobilization and training rates, weapon resupply stocks, transport capacity and speed, and attrition effects. Figure 6 shows results from a computer simulation.

**Uncertainties.** Many, many assumptions are required in the construction of a simulation model. Force generation rates, weapon scoring and effectiveness, force interactions, effects of air forces on the ground war, terrain considerations, the effects of interdiction, troop movement rates, and aircraft sortie rates are only some of the dozens of assumptions that have to be made before a dynamic assessment can be done. Mathematical representations of combat processes must also be formulated.

Simulations are often designed with one particular problem in mind and will therefore handle other problems less well. For example, a model designed primarily to adjudicate combat and to predict attrition and/or territorial losses is not good for analyzing logistics operations, even though it probably has a logistics subroutine. Care should be exercised in using a simulation for purposes other than those for which it was designed.

**Advantages.** One advantage of computer-based simulation assessments is that they simulate conflicts and thus generate war outcomes rather than simply measuring inputs to the conflicts. Simulations allow examination of the changes in combat outcomes resulting from changes in the inputs. It is thus possible, for instance, to simulate at least some effects of a conventional arms control agreement and to see the changes in warfighting capability that might result from changes in force structure and posture because of the agreement.

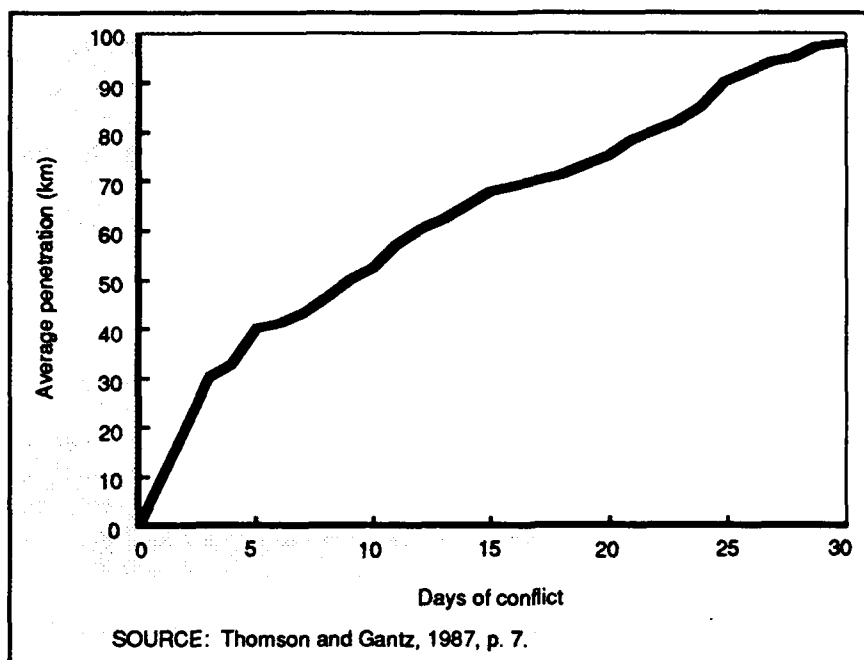


Fig. 6—Dynamic simulation assessment

Combat simulation assessments also explicitly consider time and its effects. Since battles are “fought” in the model, attrition takes its toll, and the makeup and effectiveness of the forces change over time.

Another advantage of most simulation models is that many cases can be run for the purpose of sensitivity analysis. One can change the assumptions and do several runs to determine how sensitive the results are to those assumptions. If the model is constructed well, the assumptions should not be too difficult to change. If, for example, there is uncertainty regarding estimated enemy mobilization rates, that assumption can be varied over a reasonable range to determine the effect different rates would have on the outcome of the war. If various conventional arms reduction proposals are being considered, a different simulation could be run for each proposal by changing the structure of the forces according to the stipulations of the proposals. Then the likely effects of the proposals on warfighting capabilities could be assessed. Assuming the simulation can be run in a reasonable amount of time, such analyses could be done fairly quickly.

Some of the more advanced computer-based simulations can account for differences in terrain, placement of barrier defenses, interdiction, corps sector breakthroughs, and many other combat phenomena that other types of assessments do not consider. These factors would undoubtedly affect the outcome of a battle, so their inclusion should bring a dynamic assessment's results closer to what would really happen in a conflict.

Some simulations are designed to use differing tactics depending on the situation and to attempt to act human in their decisionmaking. RAND's Strategy Assessment System, for example, utilizes artificial intelligence techniques in an attempt to introduce human-like flexibility and decisionmaking into a computer simulation.<sup>34</sup>

**Disadvantages.** The major disadvantage to computer-based simulation models is their opacity. The sheer size and complexity of the models often make determining what assumptions have been made an arduous exercise at best. Even if the assumptions can be satisfactorily determined, changing one parameter can have unexpected results. Fischer concludes that the assumptions in dynamic simulation assessments "are inevitably more questionable than the assumptions about data and scenarios used in [static analysis]. . . . [A] verbal discussion of the implications of a static analysis is, for many purposes, as useful and reliable as a dynamic approach."<sup>35</sup> Although not everyone takes this extreme a view, there is little doubt that the complexity of the assumptions made in a simulation can call into question the validity of the results.

A related problem is the many potential sources of variation and error in simulations. For example, model results can be skewed by inaccurately representing force interactions; by leaving out important factors (whether unintentionally or because they are not easily quantifiable); or by not giving appropriate consideration to the effects of terrain, weather, chance, or the vagaries of human behavior.<sup>36</sup> For example, the results of many simulations can be questioned because they do not model maneuver warfare, which is likely to be very important in future wars.<sup>37</sup>

Another disadvantage is that simulation methodologies are more difficult to explain to nonanalysts than are static count or buildup rate assessment methodologies. Results can be presented as being derived

<sup>34</sup>For additional information on the RAND Strategy Assessment System, see The RAND Corporation, 1987; and Davis, Bankes, and Kahan, 1986.

<sup>35</sup>Fischer, 1976, p. 45.

<sup>36</sup>Simulations based on simple equation models such as the Lanchester equations can have the same problems as mentioned in the previous section.

<sup>37</sup>See Kugler, 1986, pp. 31-36.

from wargame simulations, so the situation is not untenable. However, without spending a great deal of time detailing the differences between the simulations, one could find it very difficult to explain why two simulations using the same basic scenario have generated differing results. Such a situation can be very frustrating for a balance assessment consumer and could cause dynamic assessments to be disregarded entirely.

Another problem with simulations is that it is not easy, and some would say impossible, to get a computer to act human. Humans will obviously be an important part of any war; the results of any simulation that does not include the human factor will be skewed in unknown directions. The effects of using operational art and intuition, and even the consequences of human failings, would not be evident in a computer simulation. Some hold the opinion that "[a]ny attempt to program a computer to show discretion, and there have been many, is bound to fail."<sup>38</sup>

### **War Games Involving Human Players**

War games using human players are just that: people sitting around in a room and pretending to be at war. There can be any number of teams involved in a war game, but three is usually the minimum. There is ordinarily a "control" team, which dictates the world situation or "scenario," decides what information each of the other teams receives, and observes and often publishes the results of the game. There will normally be at least one "Blue" team (usually representing NATO) and one "Red" team (usually representing the Warsaw Pact). Sometimes an extra team representing neutral countries plays as well. There can also be more than one Blue or Red team. On the Blue side, for example, there might be different teams playing the West German government, the U.S. President, the U.S. Joint Chiefs of Staff, the French government, and the NATO military commanders. Frequently, equation-based models or computer simulations are used to determine the results of hypothetical battles.

Human-played war games can be played at any level of detail desired. Teams can spend days playing out just one small tactical battle or fighting a global protracted war to its end.

**Uncertainties.** Several assumptions must obviously be made before and during the course of a human-played war game. The game scenario must be set up. Many considerations enter into scenario determination. The political situation between the warring parties,

<sup>38</sup>R. Macdonald, 1988, p. 25.

hostilities in other parts of the world, whether sea-going troop convoys will be attacked, the amount of warning time each side has, the current status of all sides' forces (i.e., fully mobilized, only partially mobilized, or at peacetime postures), behavior of neutral nations, available intelligence on the enemy, and many other variables are important to the scenario. All of these assumptions must be made explicit before or during the game.<sup>39</sup> A decision must also be made regarding how the outcomes of battles are to be determined. The control team must decide whether these outcomes will be decided using simple models, computer simulations, or human judgments.

**Advantages.** One advantage to war games using human players is the uncertainty that is often built into the games by the control teams. Different kinds of information might be withheld from the teams or intentionally distorted to varying degrees. These distortions of reality can be dispensed to the different teams to varying degrees at the discretion of the control team. The Blue team, for example, might be told that a neutral nation will probably be supporting Blue, while the Red team is told that the same nation is disposed toward supporting Red. Reality might be either of those situations, or it might be that the nation in question has decided to remain entirely neutral. As another example, Red might be told that intelligence sources indicate that various factions within the Blue team are in disagreement about whether to surrender, when the Blue team is in fact united behind a plan to counterattack. Such filtering of information might seem rather capricious at first glance. However, exactly this kind of situation could be expected to be the norm rather than the exception before or during a conflict. Perfect information is virtually never available. If the war game is to imitate reality, such "information filtering" is necessary.

War games with human players permit assessments of the balance to include nonquantifiable factors. Players usually enter the game with, or are given, some knowledge about their side's C<sup>3</sup>I capabilities, logistics operations, military operational art, and other important factors that cannot be effectively captured by equations. Players can alter their attack or defense plans according to their command and control capabilities and their expected supplies of munitions. They can utilize tactical surprise and other "force multipliers" to make more efficient use of the forces they have rather than just grinding their forces against their opponent's forces in a war of attrition.

War games treat time explicitly. Most games are organized to consider how a conflict situation changes over time. Teams decide on

<sup>39</sup>The game players need not be told *everything* about the world situation. Indeed, it is usually preferable to leave some things intentionally uncertain. However, even the decision to do this must be made at some point.

their moves and are then faced with the changes resulting from their moves and those of their opponent. They can then continue with their current strategy or modify that strategy according to the new situation.

**Disadvantages.** War games involving human players are not really designed for use as balance assessments. Some problems occur when they are inappropriately used as balance assessments.

One major disadvantage of human-played war games is the lack of reproducibility. The same scenario given to two different sets of teams can, and indeed is expected to, produce quite different results. Even small changes in the way the scenario is set up or presented can have large effects on the outcomes of the game. This effect is primarily an artifact of having humans involved. People are not always consistent, and two different people will almost certainly look at the same situation in slightly different ways. Even the same person might view the same situation very differently on two different days, perhaps because of something he read in the morning paper or because he has a headache one day and not the other. But whatever the reasons, the same war game scenario is unlikely to elicit the same results twice.

War games do not lend themselves well to sensitivity analysis. To test the sensitivity of a game's result to the value of one particular variable, one would want to do at least three or four games using different values of that variable. That is potentially very time-consuming. Teams spending an entire day playing a war game might simulate only a day's worth of warfare. When dealing with conventional war, one would want to simulate at least a week or two of conflict. Doing this three or four times in succession is barely feasible because one wants experienced players. But there are certainly dozens of variables for which sensitivity analyses would be worthwhile. Performing that many assessments within a reasonable timeframe with war games with human players is an unworkable proposition.

Another potential problem with war games is that they are, in fact, only games. The players know that they are not really at war, and it is possible that they would make different decisions if they were involved in a real conflict. The tensions and stresses one would expect in a war situation are not present to the same extent in war games.

Human-played wargames can lack transparency regarding human decisionmaking processes. It is often not possible to understand why a person made a particular decision in a game and what factors influenced that decision. Although this condition certainly mimics reality, it makes assessment of the effects of changes in the scenario or in the input variables difficult. It is possible to ask the players how and why they made certain decisions; however, it is impossible to know whether

the answers will be complete or accurate. Memories are not perfect, and people cannot always describe how they came to make a particular decision.

### **Summary Critique of Assessment Methods**

No single balance assessment technique will be the best one to use for any purpose. Different methodologies are more useful for some purposes but less so for others. Table 2 summarizes the advantages and disadvantages of all four types of balance assessment methodologies.

Both regular and weighted static count methodologies are too simplistic to be relied upon as the sole source of balance assessments. Although they are easy to do and to explain, too many important factors are left out. War itself is a dynamic process; static approaches cannot hope to capture it. IISS suggests that the inability to relate inputs to outcomes is a major weakness of static balance measures.

Although [static assessment methods] provide additional data on capabilities, they do not examine the interaction between the two forces, and so do not help the analyst seeking to understand "how well" NATO might reasonably be expected to perform. This is a critical deficiency in the European context, where NATO's goal is not necessarily parity in a particular measure of capability, however sophisticated, but rather an appropriate degree of ability to resist an attack.<sup>40</sup>

However, static methodologies have their uses. They are a necessary input for more complex assessment methodologies. They can be useful for making resource allocation decisions, and they are also useful in arms control. The four most recent agreements limiting existing weapon systems or defenses (SALT I, part of the ABM treaty, SALT II, and the INF treaty) have all included static counts as the measure of compliance. Such agreements made in the future will very likely do the same.

Buildup rate balance assessments are a compromise between the simplicity of static counts and the complexity of dynamic assessments. Buildup curve methodologies are particularly good for considering the Pact-NATO force ratio under different mobilization time scenarios. However, such considerations as sustainability and tactics are left out, and how the situation changes once the battle has begun is not addressed.

A dynamic simulation that accurately and completely represents all of the phenomena associated with combat will never exist. However,

<sup>40</sup>IISS, 1987, p. 228.



Table 2  
SUMMARY COMPARISON OF BALANCE ASSESSMENT METHODOLOGIES

Category of Methodology	Advantages	Disadvantages
Static Counts	<ul style="list-style-type: none"> <li>Are easy to do</li> <li>Are easily usable for sensitivity analysis</li> <li>Are transparent</li> <li>Are very common</li> <li>Are primary basis for denominating arms control agreements</li> <li>Can be useful for making resource allocation decisions</li> </ul>	<ul style="list-style-type: none"> <li>Do not predict combat outcomes</li> <li>Do not account for quality of systems</li> <li>Ignore combat phenomena</li> <li>Do not consider changes in number of available forces because of mobilization and conflict</li> <li>Can be misleading</li> </ul>
Weighted Static Counts	<ul style="list-style-type: none"> <li>Consider quality and quantity of systems</li> <li>Provide a common measure for comparing different kinds of forces</li> <li>Are easily usable for sensitivity analysis</li> </ul>	<ul style="list-style-type: none"> <li>Do not predict combat outcomes</li> <li>Ignore combat phenomena</li> <li>Do not consider changes in number of available forces because of mobilization and conflict</li> <li>Are somewhat less straightforward than static counts</li> <li>Can include questionable assumptions about relative worth and quality of weapons</li> <li>Often ignore combined arms effects and different effectiveness of units in different situations</li> </ul>
Buildup Rate Techniques	<ul style="list-style-type: none"> <li>Consider how numbers change because of mobilization</li> <li>Are well-suited for sensitivity analysis</li> <li>Can be done for weapons, units, or manpower</li> </ul>	<ul style="list-style-type: none"> <li>Do not predict combat outcomes</li> <li>Ignore combat phenomena</li> <li>Do not consider changes in number of available forces because of mobilization and conflict</li> <li>Can include questionable assumptions about mobilization rates</li> </ul>

Table 2—continued

Category of Methodology	Advantages	Disadvantages
Dynamic Techniques Equation-based models	Predict combat outcomes Consider changes to forces over time Usually lend themselves well to sensitivity analysis	Often ignore important combat phenomena Generate outcomes that frequently do not agree with historical reality Include assumptions that are often difficult to determine
Computer simulations	Predict many types of combat outcomes Consider changes to forces over time Are good for sensitivity analysis (if built properly) Can account for many combat phenomena Can use adaptive tactics	Are very complex with many assumptions and parameters Many sources of variation and error Can be difficult to explain Cannot replicate human behavior
Human-played war games	Can replicate uncertainties inherent in combat situations Can replicate human behavior Include effects of nonquantifiable phenomena Consider changes in forces over time	Are not reproducible Are not usable for sensitivity analysis Are only games, and players know that Can lack transparency regarding decision processes

dynamic methodologies are useful tools for assessing the balance as long as they are used carefully. Fischer suggests that "a dynamic approach may be most valuable not to test outcomes, but to test the relative impact of varying assumptions about force availability, capability, reinforcements, etc."<sup>41</sup> It is unwise to accept any given output of a dynamic model as truth. The implicit assumptions about the nature of combat used in these models can bias the results.<sup>42</sup> However, varying inputs and assumptions and then observing the relative changes and trends can provide useful insights. Epstein suggests that if good judgments are to be made about force adequacy, inputs must be used to generate outputs "in a plausible way" rather than accepted as a measure themselves.<sup>43</sup> Assessments done using the multiscenario analysis framework suggested by Davis can present a useful picture of the balance while facing up to the uncertainties inherent in dynamic simulations and in war itself.<sup>44</sup>

When one is judging the worth of various methods of assessing the conventional balance, it is important to remember exactly why assessments are being done at all. Balance assessments are most useful when performed to provide insights on the adequacy of existing or postulated forces and on the effect of possible changes to those forces. The results of these assessments influence defense policy in general and postulated force requirements in particular. Modeling a conflict and determining its likely outcomes are complex problems. Balance assessment methodologies seek to put some kind of structure around this issue. However, analysts need to remember that the results of balance assessments are not the results of real conflicts. Assessment methodologies are simply tools. They are potentially very useful tools, but they must be used with care. They have their limitations, but, as one analysis points out,

[M]ost assessments recognize their fundamental limitations. All assessments are artifacts. They are created to add order and simplicity to something that is inherently complex, obscure, and changing. As such, they cannot portray fully the nuances of perception, the elements of uncertainty, or the processes of change that characterize the entire relationship between NATO and the Warsaw Pact. And while static assessments of the forces on both sides and dynamic simulations of their interactions can help clarify the actual balance, they cannot fully capture the confusion of actual war nor predict its outcome with high reliability.<sup>45</sup>

<sup>41</sup>Fischer, 1976, p. 45.

<sup>42</sup>Posen, 1984-85; Posen, 1988.

<sup>43</sup>Epstein, 1985, p. 1.

<sup>44</sup>Davis, 1988, esp. pp. 7-17.

<sup>45</sup>Congressional Budget Office, 1977, p. 6.

Although balance assessment methodologies have their limitations, some of them can be useful tools for assessing progress toward conventional stability, which is based on the expected outcomes of actual conflicts and the relationship between these outcomes and military objectives. Because regular and weighted static counts and buildup rate techniques address neither of these issues, they are not appropriate methodologies for assessing changes in conventional stability. Human-played war games are not ideal for reasons of design and irreproducibility, and equation-based models usually do not capture enough of the important combat phenomena to reliably assess changes in conventional stability. Dynamic simulations are the most promising for this purpose.

### PERCEPTIONS OF THE CONVENTIONAL BALANCE

Few in the West seriously claim that NATO could attack the Warsaw Pact and win. However, there is a wide variety of opinion on how well NATO could defend itself in the face of an attack by the Pact. Scenarios range from NATO having to use nuclear weapons after only a few days of conventional war to NATO being able to sustain a cohesive conventional defense near the IGB for a respectable amount of time. Obviously, the range of perceptions is large.

At one end of the spectrum are some highly optimistic assessments of the NATO-Pact conventional balance. Posen claims that "under very demanding circumstances, NATO appears to be fully competitive with the Warsaw Pact, and would probably thwart a conventional attack."<sup>46</sup> Mearsheimer believes that not only are NATO's prospects for a conventional defense fairly good, but that "conventional wisdom which claims otherwise on this matter is a distortion of reality."<sup>47</sup> At the other end of the spectrum are some who are quite pessimistic about the balance. Frenchman Raymond Barre sees a "dangerously large" imbalance in conventional forces in the Pact's favor,<sup>48</sup> as does Georges Fricaud-Chagnaud.<sup>49</sup> Kim Holmes believes not only that the Pact is conventionally superior but also that they have many advantages as the attacker while NATO enjoys few of the advantages of the defender.<sup>50</sup> Phillip Karber notes trends that have shifted the balance

<sup>46</sup>Posen, 1988, p. 200.

<sup>47</sup>Mearsheimer, 1982, p. 36. Similar points are made in Mearsheimer, 1988, p. 184.

<sup>48</sup>Barre, 1987, p. 297.

<sup>49</sup>Fricaud-Chagnaud, 1988, p. 24.

<sup>50</sup>Holmes, 1988, p. 173.

substantially in the Pact's favor.<sup>51</sup> General Bernard Rogers, former Supreme Allied Commander Europe (SACEUR), has declared that "NATO's present conventional forces probably could not mount an effective defense of the alliance's central front for more than a few days."<sup>52</sup>

Without a doubt, the mainstream of opinion is between these two extremes. William Kaufmann suggests that a realistic look at the balance "challenges the view that NATO is vastly inferior to the Warsaw Pact in conventional capability or that it is far from having a credible nonnuclear deterrent in Central Europe."<sup>53</sup> Richard Kugler states that the Pact's buildup has outpaced NATO's efforts, but that this "is not to imply that the balance has tilted to the extent that NATO cannot execute its defensive strategy, or that the Soviets could be confident of victory in a war."<sup>54</sup> In fact, some observers specifically point out that neither extreme pessimism nor extreme optimism is warranted.<sup>55</sup> The majority perception of the conventional balance is characterized not primarily by pessimism or optimism, but by caution and qualification. Although some feel slightly pessimistic while others feel slightly optimistic, there is general agreement that NATO's defenses would not do badly under some scenarios and would probably fail under others. Dynamic assessments using a variety of scenarios have led Davis to the conclusion that "the balance is demonstrably quite fragile. Many 'good cases' turn into 'bad cases' with only modest changes of assumption." He also believes that scenarios unfavorable for NATO are at least as likely as, or more likely than, favorable scenarios.<sup>56</sup> One common observation is that NATO's prospects might not be too bad unless NATO has little warning time, either because the Pact attacks quickly or because NATO fails to make a timely decision to mobilize its forces.<sup>57</sup> Schear and Nye suggest that "NATO's main problem is potentially slow reaction time."<sup>58</sup> This is a well-recognized problem. NATO forces that might be able to hold off a Pact attack certainly cannot do so if they have not been ordered to prepare. This problem, along with NATO's narrowing technological lead and other problems, has led to conclusions that trends in the balance are worsening for NATO.<sup>59</sup>

<sup>51</sup>Karber, 1984, p. 40.

<sup>52</sup>Record and Rivkin, 1988, p. 736.

<sup>53</sup>Kaufmann, 1983, p. 51.

<sup>54</sup>Kugler, 1986, pp. 17-18.

<sup>55</sup>Betts, 1985, p. 171; and Davis, 1988, p. vi.

<sup>56</sup>Davis, 1988, p. vi.

<sup>57</sup>See, for example, Betts, 1985, p. 162; and Mako, 1983, p. 55.

<sup>58</sup>Schear and Nye, 1988, p. 48.

<sup>59</sup>See, for example, Department of Defense, 1988, pp. 106, 117; North Atlantic Assembly, 1984a, p. 2; and Schear and Nye, 1988, p. 48.

At this point, it is reasonable to conclude that the only consensus about the conventional balance is that it is uncertain.<sup>60</sup> Opinions are diverse, but the predominant one seems to be that NATO might be able to defend itself in some cases but cannot afford to allow the balance to deteriorate any further, particularly given perceptions of the decreasing role of nuclear weapons discussed earlier.

## PERCEPTIONS OF STABILITY

The most important thing to remember when dealing with stability issues is that reality or "ground truth" is important, but not as important as how the situation is perceived by the sides involved. It is these perceptions that drive defense planning, arms control possibilities, and the relations and atmosphere between the two alliances. Whether a thing is "true," however that is defined, is less important than how it is perceived. Thus, if a capability or an attitude held by one side is perceived by the other side as being destabilizing, it becomes destabilizing because of that perception. As Betts puts it, "deterrence depends not on the intentions of the deterrer, but on the beliefs of the deterree."<sup>61</sup>

An obvious question worth addressing is what NATO and its members consider destabilizing about the conventional balance in Europe. NATO observers perceive three main factors as destabilizing: the Pact's capability to launch a short-warning attack against NATO, the Pact's doctrinal emphasis on offensive operations and a force posture geared toward supporting that strategy, and the large disparity in size between NATO and Pact forces.

### The Pact's Short-Warning Attack Capability

One stabilizing factor from NATO's point of view would be to ensure that the Pact does not have the capability to launch a decisive short-warning attack in Europe. This type of attack is one that has consistently bothered NATO planners for many years. The basic problem is that many in NATO perceive the Pact as having the capability to launch a conventional attack against NATO with little or no warning. NATO, it is argued, whether because of maldistribution of forces or because of disagreements about the nature of the situation or the appropriate response, could be unable to respond in time to prevent the

<sup>60</sup>Thomas J. Hirschfeld, former deputy U.S. representative to the MBFR negotiations, points out that there is "no consensus in the West on the military balance in Europe" and that this could potentially be a serious problem for NATO in the proposed Conventional Stability Talks. Hirschfeld, 1988, p. 14.

<sup>61</sup>Betts, 1985, p. 175.

Pact from gaining substantial territory in Western Europe. For this reason, NATO perceives the emphasis on surprise in Soviet doctrine and the Pact's ability to launch a short-warning attack as very destabilizing. General Galvin has observed that during "the past decade we have seen the development of doctrine, organizations, and equipment designed to enhance the USSR's ability to conduct rapid offensive operations."<sup>62</sup> Decreasing the Pact's ability to launch such an attack is continually mentioned by NATO observers as one of the most important objectives of conventional arms control talks. Schear and Nye assert that "NATO needs to be sure that reductions would limit operationally the ability of the Warsaw Pact front line to mount unreinforced, short-warning attacks."<sup>63</sup> This sentiment is echoed by many others.<sup>64</sup> Restricting the Pact's capability to launch a short-warning attack would clearly be seen by NATO as an enhancement to stability.

### **The Pact's Offensive Strategy and Posture**

Another capability widely perceived as destabilizing by NATO is the offensive strategy and posture of Pact forces. Soviet doctrine emphasizes the need for offensive operations, and the heavily armored Pact forces are structured and trained to support that strategy. Voigt believes that "the principal source of military instability in Europe is . . . the Soviet strategy of the territory-taking counter-offensive."<sup>65</sup> Various aspects of the Pact's offensive capability are perceived by many within NATO to be destabilizing. The heavily armored nature of Pact forces is seen as a substantial problem by Dean and by Fischer.<sup>66</sup> The Pact's capability to launch large-scale offensive operations is considered particularly destabilizing.<sup>67</sup> Tanks and artillery are two specific weapon systems that cause a great deal of concern and are often cited as being good candidates for arms control because of their armored offensive capability.<sup>68</sup>

Large stockpiles of ammunition and fuel and some types of support units maintained near the IGB are related capabilities that support

<sup>62</sup>Galvin, 1988, p. 56.

<sup>63</sup>Schear and Nye, 1988, p. 52.

<sup>64</sup>d'Aboville, 1988, pp. 155-156; Dean, 1988, p. 74; Hirschfeld, 1988, p. 13; Hunter, 1988, p. 221; Ledogar, 1987, p. 36; Rühl, 1988, p. 38; Voigt, 1987, p. 27.

<sup>65</sup>Voigt, 1987, p. 14.

<sup>66</sup>Dean, 1988, p. 74; Fischer, 1976, p. 40.

<sup>67</sup>d'Aboville, 1988, p. 156; Ledogar, 1987, p. 36; Rühl, 1988, p. 38; North Atlantic Council, 1988, p. 32.

<sup>68</sup>See, for example, Thomson and Gantz, 1987, p. 14; Carlucci, 1988, p. 39; and Galvin, 1988, p. 56.

offensive operations and are thus considered by some to be destabilizing. Former U.S. Secretary of Defense Frank Carlucci has suggested reducing bridge-building equipment and engineering units in Eastern Europe as a measure that would inhibit offense but not defense.<sup>69</sup> Former U.S. ambassador to MBFR Jonathan Dean has suggested reducing armored reconnaissance units, bridge-building units, mobile anti-aircraft units, and mine-clearing units because "without [their] support heavy armored forces cannot move forward in attack."<sup>70</sup> Large stocks of ammunition and fuel are also of concern. SACEUR General Galvin has suggested that the buildup of these stockpiles is destabilizing,<sup>71</sup> and Carlucci has proposed their reduction as a stabilizing step the Pact could take unilaterally without endangering their defensive capabilities.<sup>72</sup> As a specific measure designed to make sustaining an attack more difficult, Dean has proposed pulling back "major ammunition and fuel storage depots 100 kilometers or so" away from the IGB.<sup>73</sup> Reduction of these units and stockpiles, some argue, would enhance stability by making attacking more difficult without seriously affecting either side's ability to defend itself against an attack. However, Warner and Ochmanek point out that these kinds of forces and equipment are also needed by the defense.<sup>74</sup>

#### **Disparity in Size of NATO-Pact Forces**

Another aspect of the conventional balance in Europe perceived as destabilizing by NATO is the disparity in size between the NATO and Pact forces. According to many in the West, the Pact's quantitative conventional superiority provides the Pact with the capability to launch large-scale, successful offensive operations. Obviously, this perception causes great concern within NATO. Most in the West would view eliminating this disparity as a stabilizing factor.

Although reductions in NATO-Pact force disparities would be seen as a contribution to stability, two caveats are often cited. First, equality alone is not itself sufficient to produce a stable situation. Mearsheimer states: "It would be a mistake to assume that a stable conventional balance exists simply because forces are equally balanced."<sup>75</sup> There seems to be a consensus on this particular point. Others have also noted that

<sup>69</sup>Carlucci, 1988, p. 39.

<sup>70</sup>Dean, 1988, p. 80.

<sup>71</sup>Galvin, 1988, p. 56.

<sup>72</sup>Carlucci, 1988, p. 39.

<sup>73</sup>Dean, 1988, p. 81.

<sup>74</sup>Warner and Ochmanek, 1989, p. 110.

<sup>75</sup>Mearsheimer, 1988, p. 177.



stability does not necessarily follow from an equality of forces.<sup>76</sup> The qualitative features of the forces as well as the quantitative aspects are considered important. Albrecht von Müller points out that "stability and balance are often mistakenly equated to each other. But equilibrium or symmetry do not in the least imply that stability exists." He goes on to point out that offensive capability and the rewards for preemption can have a greater effect on stability than symmetry can.<sup>77</sup>

A second point suggested by some analysts is that reductions in the levels of conventional forces could make the situation worse for NATO if the reductions are not taken correctly. Von Müller shows that symmetric reductions made with good intent can introduce instability into a previously stable situation,<sup>78</sup> and Thomson and Gantz show that in Europe, even reductions at a Pact-NATO ratio of 3:1 can make NATO considerably worse off than it is currently.<sup>79</sup> Reductions in NATO's forces could create "force-to-space" problems. The force-to-space ratio is an indicator of the amount of territory that a unit can be expected to defend coherently. If the number of NATO forces fell below some amount,<sup>80</sup> the enemy could achieve breakthroughs that would compromise the defensive line. If the breakthroughs remained unchecked, NATO could suffer a major defeat. Many analysts argue that the current NATO force levels are close to that minimum amount and that substantial reductions could seriously jeopardize NATO's ability to defend.<sup>81</sup>

### Summary

From the point of view of many NATO observers, stability in the conventional situation in Europe is weakened today by uncertainty about the objectives of the Soviet leadership combined with the Pact's ability to launch large-scale offensive operations and to do so with little warning. Until such time as the political environment changes so substantially that Soviet expansionism is no longer considered a

<sup>76</sup>Bellany, 1981, p. 3; Borawski, 1988, p. 17; Burt, 1988, p. 30.

<sup>77</sup>Von Müller, 1987, p. 8.

<sup>78</sup>Ibid., p. 11.

<sup>79</sup>Thomson and Gantz, 1987, pp. 10-12.

<sup>80</sup>A frequently used rule of thumb calls for a minimum of one armored division equivalent to defend 25 km along the IGB. Assuming a 650-750 km frontier, NATO would need a minimum of 26-30 ADEs plus operational reserves to defend. The roughly 34 ADEs that are in Central Europe in peacetime would barely fulfill that requirement (Thomson, 1988, p. 5). Even the 46-60 divisions that would be available after a few weeks of mobilization would be enough only to provide NATO with a defensive line and a small reserve (Kugler, 1986, p. 23).

<sup>81</sup>See Warner and Ochmanek, 1989, p. 111; Mako, 1983, p. 64; and Snyder, 1988, p. 67.

serious threat, enhancing stability will depend on altering the capabilities of military forces enough to change the perceptions of what the Pact has the ability to do.

Although equality in force levels alone is not sufficient for stability, a reduction in the disparity of forces between NATO and the Pact would be perceived as a step toward stability. Other factors, such as a reduction in the offensive capability of forces and the elimination of the short-warning threat to NATO, in combination with reduced force level disparities in Europe, would greatly improve stability.

### **DEFENSE OBJECTIVES AND MEASURES OF EFFECTIVENESS**

According to the North Atlantic Assembly's Sub-Committee on Conventional Defence in Europe, the debate over how to improve conventional defense and stability in Europe is hindered by a lack of understanding regarding what NATO wants to accomplish and how to measure progress toward that goal.<sup>82</sup> NATO needs a concrete and universally accepted objective for its defense. Such an objective would provide a basis against which to measure the effects of suggested force improvements and arms control proposals. Using the definition of conventional stability suggested earlier, achievement of stability depends on whether military objectives are achieved. Therefore, objectives must be chosen before progress toward stability can be assessed.

There are three basic elements upon which, either individually or in combination, defense objectives can be based. The first is space. A defense objective can be phrased, for example, in terms of the maximum average penetration into West Germany or the maximum area that the defense is willing to give up. The second measure is time. It might be suggested that the defense must hold for a minimum of, say, 30 days, in hopes that that would allow time to work out a political solution to the conflict. The third element is coherence. This is a less well-defined concept; however, a successful defense might be considered as one that does not catastrophically fail and allow a Pact breakthrough into NATO's operational rear. Objectives are often phrased in terms of some combination of these three elements. For example, the objective might be a coherent defense for 30 days, no more than 40 km penetration in 45 days, or a coherent defense allowing no more than 50 km penetration in 30 days.

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<sup>82</sup>North Atlantic Assembly, 1984b, p. 3.

NATO strategy currently calls for a forward defense close to the IGB. Another objective that has been suggested is to hold the economic and communication centers of the Ruhr/Rhine Valleys, which include the U.S. military stockpiles in the Frankfurt-Mainz-Worms area.<sup>83</sup> This area is 100-150 km from the IGB. Another possible objective, and the one that will be used in the following analysis, is a successful forward defense, which is defined as holding the Pact to an average gain of less than 30 km of West German territory for 30 days.<sup>84</sup> This objective is consistent with MC 14/3,<sup>85</sup> which calls for "a flexible and balanced range of appropriate responses" to aggression, including conventional force options intended "first to deter aggression" but also "to maintain the security and integrity of the North Atlantic Treaty area within the concept of forward defence" should deterrence fail.<sup>86</sup> Since NATO guidelines call for a 30-day supply of war stocks (spare parts, fuel, ammunition, etc.),<sup>87</sup> the time requirement is also consistent with NATO's defense plan.

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<sup>83</sup>Fischer, 1976, p. 6.

<sup>84</sup>Thomson and Gantz, 1987, p. 4.

<sup>85</sup>Ibid.

<sup>86</sup>"Communique of the Ministerial Meeting of the North Atlantic Council," 1975, p. 197.

<sup>87</sup>North Atlantic Assembly, 1984b, p. 14.

### III. THE CONVENTIONAL BALANCE AND STABILITY IN EUROPE—THE WARSAW PACT PERSPECTIVE<sup>1</sup>

A better understanding of Warsaw Pact assessments of the conventional balance is "critical to an accurate evaluation of the deterrent quality of NATO forces."<sup>2</sup> Discovering Pact perceptions of the balance in Europe is a crucial step toward enhancing deterrence and increasing stability.

Discussion of this topic must be prefaced with a caveat. It is at best questionable to claim that one has determined what the Pact or the Soviets "really" think about such issues. MccGwire points out that evidence about Pact military issues is limited and "can be interpreted in various ways, including being dismissed as propaganda."<sup>3</sup> Some of the evidence that is available might be of questionable reliability. Lambeth notes that Soviet civilian academic analysts who write about military matters usually have a larger audience abroad than at home, are reputed to have little input into the policy process, and often echo the arguments of Western defense critics.<sup>4</sup> In general, the Pact releases very little information about its military forces to its own civilians or to the West. Most of the Pact sources quoted here have been published recently. Mandate talks for the Conventional Forces in Europe negotiations were either expected or occurring during most of this period. The information released by the Pact during this time might therefore have been released for largely political purposes.

No claim is made that what follows is an exhaustive analysis of Pact assessments and perceptions about the conventional balance and conventional stability in Europe. It is rather intended to provide an overview of the recent open translated literature on the subject and to give the reader a general idea of how the Pact countries appear to look at the issues surrounding conventional forces in Europe.

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<sup>1</sup>I am indebted to RAND colleagues Robert Nurick and Lilita Dzirkals for their invaluable assistance with this section.

<sup>2</sup>Department of Defense, 1988, p. 113.

<sup>3</sup>MccGwire, 1988, p. 6.

<sup>4</sup>Lambeth, 1984, p. 39. Warner suggests that the role of the civilian analysts seems to be increasing but notes that the "professional military establishment apparently continues to maintain control over detailed information on Soviet and foreign military forces and remains the primary formulator of the military-technical side of Soviet military doctrine." Warner, 1989, pp. 11-12.

## METHODS OF EVALUATING THE CONVENTIONAL BALANCE

Techniques used to assess the conventional balance are more difficult to document for the Pact than for NATO, particularly at the unclassified level. When an assessment technique is used, there is usually no commentary on the relative advantages or disadvantages of the technique.<sup>5</sup>

### Static Counts

Static counts are used as often by Pact analysts as by their NATO counterparts. Until recently, most static count assessments found in Pact sources cited numbers drawn from NATO sources rather than numbers determined by the Pact countries themselves. One Soviet government publication, *Whence the Threat to Peace*, and an article by Dmitri Yazov, the Soviet Minister of Defense, give some numbers and ratios that can be considered "official." The Pact released some official manpower counts in 1980 at the MBFR negotiations and has recently released a fairly comprehensive set of figures on force strengths. These data are summarized in Table 3. Although static assessments are prevalent, Kokoshin notes that assessing the combat capabilities of the two sides "will require more complex layouts and studies than a traditional numerical comparison of the opposing forces—comparing the number of divisions, tanks, aircraft, artillery pieces, missile launchers, and so on."<sup>6</sup> Leonidov considers beancounts "unsound for serious analysis."<sup>7</sup> The limitations of simple beancounts are apparently recognized by both NATO and the Pact.

There are many differences between the Pact's and NATO's static counts. A comparison of Table 1 and Table 3 shows some of those differences. Although the two agree that there is approximate equality of personnel in Europe, they differ in many other areas. NATO gives the Pact an advantage in every category of weapon, and Pact sources cite NATO superiority in every category except tanks, infantry fighting vehicles, air defense interceptors, and artillery and related systems. They both agree that the Pact has superiority in tanks, but the Pact asserts that NATO's tank inventory is approximately 50 percent higher than NATO claims.

<sup>5</sup>The basic techniques and their uncertainties are described in the previous section.

<sup>6</sup>Kokoshin, 1988b.

<sup>7</sup>Leonidov, 1989.

Table 3  
PACT STATIC BALANCE ASSESSMENTS

	Pact	NATO	NATO:Pact Ratio
Combat-ready divisions	78 <sup>a,b</sup>	94 <sup>a,b</sup>	1.2:1 <sup>a,b</sup>
Combat-ready formations			1.5:1 <sup>c</sup>
Personnel	3,573,100 <sup>d,e</sup>	3,660,200 <sup>d,e</sup>	1:1 <sup>b,c</sup> ; 1:1 <sup>d,e</sup>
Ground	815,000 <sup>f,g</sup>		
Air	182,000 <sup>f,g</sup>		
Artillery			1:1 <sup>a,c</sup>
Rocket-propelled systems, artillery, and mortars	71,560 <sup>d,e</sup>	57,060 <sup>d,e</sup>	1:1.3 <sup>d,e</sup>
Tanks	NATO+20,000 <sup>b,c</sup> ; 59,470 <sup>c,d</sup>	18,000 <sup>a</sup> ; 30,000 <sup>a,f,h</sup> 30,690 <sup>d,e</sup>	1:1.9 <sup>d,e</sup>
Infantry combat vehicles and armored transports	70,330 <sup>d,e</sup>	46,900 <sup>d,e</sup>	1:1.5 <sup>d,e</sup>
Anti-tank missile complexes	11,465 <sup>d,e</sup>	18,070 <sup>d,e</sup>	2:1 <sup>c</sup> ; 1.6:1 <sup>d,e</sup>
Combat planes	5,355 <sup>d,e</sup>	5,450 <sup>d,e</sup>	1.2:1 <sup>a</sup> ; 1:1 <sup>d,e</sup>
Air defense interceptors <sup>i</sup>	1,829 <sup>d,e</sup>	50 <sup>d,e</sup>	1:36 <sup>d,e</sup>
Strike aircraft	2,783 <sup>d,e</sup>	Pact+1400 <sup>b,c</sup> 4,075 <sup>d,e</sup>	1.5:1 <sup>d,e</sup>
Navy combat aircraft	692 <sup>d,e</sup>	1,630 <sup>d,e</sup>	2.4:1 <sup>d,e</sup>
Combat helicopters	2,785 <sup>d,e</sup>	5,270 <sup>d,e</sup>	1.5:1 <sup>c</sup> ; 1.9:1 <sup>d,e</sup>

NOTE: Pact figures for NATO usually include French and Spanish forces.

<sup>a</sup>Whence *The Threat To Peace*, 1987, pp. 75-76.

<sup>b</sup>In Europe.

<sup>c</sup>Yazov, 1988, pp. 19-21.

<sup>d</sup>Warsaw Pact Defense Ministers Committee, 1989, p. 2.

<sup>e</sup>In Europe and adjoining waters.

<sup>f</sup>Dean, 1987b, p. 159.

<sup>g</sup>Numbers were provided by Pact representatives within the framework of the MBFR negotiations and so are presumably counts for personnel in the NATO Guidelines Area. The numbers were tabled in 1980.

<sup>h</sup>Includes weapons in storage depots.

<sup>i</sup>Capable of operating against ground targets.

### Weighted Static Counts

The Institute of World Economy and International Relations *Disarmament and Security: 1987 Yearbook* illustrates one attempt at weighted static counts.<sup>8</sup> Combat-ready divisions have different numbers of men. A U.S. division has 16,000–19,000 men, an FRG division 17,000–23,000 men, and a Warsaw Pact division 11,000–12,000 men. With a Soviet motorized rifle division (12,000 men) and a Soviet tank division (9,500 men) as bases, a scaling factor for NATO divisions is determined. See Table 4. The data used to generate the table were taken primarily from Western sources.

### Mathematical Methodologies

There are indications that mathematical assessments are considered useful by the Soviets in the area of military forecasting. Chuyev and Mikhaylov note the importance of forecasting to planning in military affairs and suggest that “only a harmonious combination of modern research methods with the results of scientifically based forecasts and the experience and skill of the appropriate military specialists will enable complex military problems to be solved effectively.”<sup>9</sup>

Methods of mathematical modeling and operations research are used in military forecasting. Chuyev and Mikhaylov recognize some of the problems involved.

On the one hand, making the model infinitely detailed will inevitably result in its becoming too complex, which, naturally, complicates work with it and in some cases makes it impossible. On the other hand, attempts to simplify the model to the maximum extent will mean that a number of factors are not taken into account, which may have a serious effect on the process being forecast.<sup>10</sup>

Although such methods are apparently utilized, the extent to which they are used in assessing the conventional balance is unclear. Computer models are used in some military forecasting<sup>11</sup> and in nuclear force analysis;<sup>12</sup> the extent to which they are used in analysis of the conventional balance is uncertain. Nazarenko says that the conclusion of rough conventional equality between the alliances “is based on a comparison of the military potentials of both blocs, assessed with the

<sup>8</sup>The following figures and methodology are taken from Amirov et al., 1988, pp. 377–378.

<sup>9</sup>Chuyev and Mikhaylov, 1980, pp. 1, 3.

<sup>10</sup>Ibid., p. 71.

<sup>11</sup>Ibid., p. 70.

<sup>12</sup>Malashenko, 1987, p. 18.

**Table 4**  
**WTO-NATO: NUMBER OF COMBAT-READY DIVISIONS**  
**AND THEIR EQUIVALENTS**

Type of Division	WTO	NATO	
		Total	With Scaling Factor
Tank	40	28½	38½
Motorized rifle	56	74½	88½
Others	7½	8½	11
Total	103½	111½	138

The following sources have been used as the initial statistical base in these calculations: *Whence the Threat to Peace*, Moscow, 1987, p. 75; Dean, J., *Watershed in Europe*, Union of Concerned Scientists, Lexington, Mass., 1987, pp. 39-41; *Soviet Military Power*, Wash., 1986, pp. 89-91; *The Military Balance 1986-1987*, IISS, London, pp. 226-229; Voigt, K., *Draft General Report on Alliance Security: NATO-Warsaw Pact Military Balance. Nuclear Arms Control After Reykjavik*, North Atlantic Assembly, Sept. 1987, pp. 2-6.

The figures in this table may not coincide with the official Soviet data.

SOURCE: The above table was taken, including footnotes, from Amirov et al., p. 378.

help of a methodology which adduces together and takes account of all factors—political, economic, geostrategic, and purely military.”<sup>13</sup> It is unclear whether this is a reference to a global assessment model or simply a suggestion that nonmilitary factors must also be considered in the balance.

### Summary

There is little explanation in the open literature of the quantitative methods used by the Pact to assess the conventional balance. There are, however, indications that the Pact uses different methods than NATO uses. According to *Soviet Military Power*, “the Pact appears to calculate weapons effects and military force potentials differently than NATO does.”<sup>14</sup> Kokoshin observes, “One must bear in mind that there are currently considerable differences in the assessments of composition of men, equipment, and weapons of the sides (Warsaw Pact and NATO) in

<sup>13</sup>Nazarenko, 1988a, p. 34.

<sup>14</sup>Department of Defense, 1988, pp. 113, 116.



official western and Soviet publications, which . . . reflect different methods of calculation."<sup>15</sup> As shown by the comparison of static counts above, there are large discrepancies between the NATO and Pact counts of weapons and divisions. NATO and the Pact also appear to use different assumptions when considering the balance. Those used by the Pact about their own military capabilities seem to be relatively more pessimistic than those used by NATO about Pact forces.<sup>16</sup> Pact sources suggest that assessments must consider nonmilitary factors as well as military ones. The Institute of World Economy and International Relations says, "It is also evident that for a more realistic assessment of the balance it is necessary to take into account political, military and strategic aspects in the broadest possible sense."<sup>17</sup>

### PERCEPTIONS OF THE CONVENTIONAL BALANCE

Pact observers of the conventional situation in Europe are unified in their conclusion: Overall, NATO and Pact forces possess roughly equal capabilities. Soviet Defense Minister Yazov echoes the general sentiment, saying, "Altogether there exists rough equilibrium, rough parity, in conventional armaments."<sup>18</sup> Western experts and figures are frequently cited to support this conclusion. Chernyshev says, "In fact, there is an overall balance in Europe in the sphere of conventional arms, as has been noted even by eminent military experts in the West on more than one occasion."<sup>19</sup> The Soviet publication *Whence the Threat to Peace* says that Western leaders

refer to an alleged Soviet and Warsaw Treaty superiority in conventional armaments. . . . However, the world public has testimonies from such authoritative international organizations as the London [sic] Institute for Strategic Studies and the Stockholm International Peace Research Institute which, though they are not free from exaggerating data on the Warsaw Treaty forces, show that the Warsaw Treaty has no superiority over NATO and that a rough balance does exist in conventional arms.<sup>20</sup>

Although there is general agreement within the Pact that the balance is equal overall, Eastern spokesmen admit that asymmetries in individual

<sup>15</sup>Kokoshin, 1988b, p. 55.

<sup>16</sup>Department of Defense, 1988, p. 116.

<sup>17</sup>Amirov et al., 1988, p. 377. See also Yazov, 1988, p. 16.

<sup>18</sup>Yazov, 1988, p. 21. This point is cited widely in the open literature. See also Kokoshin, 1988a, p. 50; and Oprsal, 1987, p. 34.

<sup>19</sup>Chernyshev, 1988a, p. 3.

<sup>20</sup>*Whence the Threat to Peace*, 1987, p. 74. Emphasis in original.

categories exist between the two sides.<sup>21</sup> These asymmetries "considerably [complicate] a summary estimate of the real correlation of armed forces and conventional armaments of the Warsaw Treaty and NATO in Europe,"<sup>22</sup> but they "do not upset the overall military balance."<sup>23</sup>

According to the Pact interpretation of the balance, NATO has advantages in several categories of conventional force. Western superiority in combat helicopters and fighter-bombers is often cited<sup>24</sup> as is an advantage in anti-tank weapons.<sup>25</sup> The claim is also made that the "NATO naval forces have considerable superiority over the Warsaw Pact's naval forces."<sup>26</sup> Pact sources frequently assert that NATO has an advantage in the number of combat-ready divisions.<sup>27</sup> Many NATO divisions are also said to be much larger, an American division having 50 percent more personnel and a West German division having twice as many personnel as Pact divisions.<sup>28</sup> The West is also said to be superior in population and in military industrial production potential.<sup>29</sup> Some Pact sources claim that the Pact and NATO are perceived as roughly even in artillery,<sup>30</sup> but recently released official totals indicate Pact superiority in artillery and related systems.<sup>31</sup> The Pact has superiority in air defense interceptor/fighters.<sup>32</sup>

There is some disagreement about relative advantages in other categories of armaments. Some Soviet sources claim that the two alliances have approximately the same number of tanks,<sup>33</sup> though most

<sup>21</sup>Warsaw Treaty Political Consultative Committee, 1988a, p. EE/0206/C/1.

<sup>22</sup>Amirov et al., 1988, p. 371.

<sup>23</sup>Yazov, 1988, p. 19.

<sup>24</sup>"Missiles, Tanks and Good Sense," 1988, p. 12; and Tatarnikov, 1988, p. 5.

<sup>25</sup>Tomilin, 1986, p. 23; and *Whence the Threat to Peace*, 1987, p. 75.

<sup>26</sup>"The Correlation of Forces Between the USSR and the United States," 1987, p. 2.

<sup>27</sup>Chernyshev, 1988a, p. 3. What is actually counted in support of this claim is unclear. Some sources, Chernyshev among them, state that NATO has an advantage in combat-ready divisions. Other sources say that NATO's advantage is in "combat-ready formations (divisions and brigades)" (for example, Yazov, 1988, p. 20). Three brigades are normally considered the equivalent of one division. Pact forces are stationed by division and NATO has several independent brigades stationed in Europe, so counting individual brigades rather than "division equivalents" would yield a higher number of units for NATO relative to the Pact.

<sup>28</sup>Nazarenko, 1988a, p. 34.

<sup>29</sup>Oprsal, 1987, p. 34, and *Whence the Threat to Peace*, 1987, p. 75.

<sup>30</sup>Lebedev, 1986, p. 86; and Tomilin, 1986, p. 23.

<sup>31</sup>Warsaw Pact Defense Ministers Committee, 1989, p. 2.

<sup>32</sup>Tomilin, 1986, p. 23; and Amirov et al., 1988, p. 386. There is some disagreement on the degree of advantage. The former source says the Pact has a "somewhat bigger number" of interceptors, and the latter cites a "considerable advantage."

<sup>33</sup>Lebedev, 1986, p. 86; and Tomilin, 1986, p. 23.

give the Pact superiority.<sup>34</sup> Military personnel is another category in contention. Some Eastern sources claim NATO has more manpower than the Pact,<sup>35</sup> but others say the alliances have roughly equal numbers of personnel.<sup>36</sup> There is wide disagreement on the issue of tactical aircraft. Although some sources claim that the Pact has a slight advantage<sup>37</sup> or that the two alliances "are on approximately the same level as regards tactical aviation,"<sup>38</sup> most sources indicate that NATO has a definite advantage in quantity<sup>39</sup> and perhaps in quality as well.<sup>40</sup>

Pact sources generally agree that Pact conventional superiority is a myth without justification intentionally perpetrated by the West. "There is much talk in the West about the WTO's so-called 'overwhelming superiority' in conventional armaments. . . . This allegation is at variance with reality."<sup>41</sup> Allegations of Pact superiority, they claim, proceed "from an artificial and unrealistic basis."<sup>42</sup> NATO is perceived as using several tactics to distort the balance. First, Western reserve forces and weapons in stockpiles and depots are not counted.<sup>43</sup> Second, NATO overstates Pact forces by counting their building and construction troops, border guards, militia, and members of the Voluntary Society for Assisting Army, Air Force and Navy.<sup>44</sup> Third, Pact offensive air potential is exaggerated by including air defense interceptors.<sup>45</sup> Amirov et al. note that many air defense fighters "are capable of delivering strikes on ground targets and may frequently be rapidly converted to perform these missions" and so must be counted as strike aircraft or a "clear technical differentiation" must somehow be made.<sup>46</sup> Fourth, NATO sources concentrate on weapons in which the Pact has an advantage but "coily neglect to mention" weapons in which NATO is superior.<sup>47</sup> Finally, French and Spanish

<sup>34</sup>Although one source claims the Pact countries "have several times more tanks" ("The Correlation of Forces," 1987, p. 2), most sources give the Pact an advantage of 20,000 tanks. See, for example, Yazov, 1988, p. 20; and Konarski, 1988, p. 51.

<sup>35</sup>Tomilin, 1986, p. 23 and Lebedev, 1986, p. 86.

<sup>36</sup>Yazov, 1988, p. 21; and *Whence the Threat to Peace*, 1987, p. 75.

<sup>37</sup>Lebedev, 1986, p. 86.

<sup>38</sup>Tomilin, 1986, p. 23.

<sup>39</sup>Vorontsov 1987, p. AA9; and Chernyshev, 1988c, p. 2.

<sup>40</sup>Yazov, 1988, p. 19; and "Missiles, Tanks and Good Sense," 1988, p. 12.

<sup>41</sup>Yazov, 1988, p. 19.

<sup>42</sup>Oprsal, 1987, p. 34.

<sup>43</sup>"The Correlation of Forces," 1987, p. 2; and Nazarenko, 1988a, p. 34.

<sup>44</sup>"Missiles, Tanks and Good Sense," 1988, p. 12, and Yazov, 1988, p. 20.

<sup>45</sup>*Whence the Threat to Peace*, 1987, p. 75, and Tomilin, 1986, p. 23.

<sup>46</sup>Amirov et al. 1988, p. 386.

<sup>47</sup>Tatarnikov, 1988, p. 5. See also Chernyshev, 1988a, p. 3.

forces and forces under national control of NATO countries are left out when inventories are counted.<sup>48</sup> The French and Spanish forces contribute some 20 divisions and one million men to NATO forces.<sup>49</sup> At the same time, Western analysts include "Romania's armed forces, even though its constitution rules out the deployment of its forces outside its national borders."<sup>50</sup> All of these factors, it is argued, perpetuate the myth of Pact conventional superiority.

### Summary

Pact leaders and spokesmen insist that there is an overall conventional balance in Europe. The two sides are considered approximately equal in manpower and some types of combat aircraft. Most Pact sources agree that the Pact is superior in tanks, armored forces, air defense aircraft, and artillery and related systems, but that this superiority is offset by NATO superiority in strike aviation,<sup>51</sup> other types of tactical aircraft, naval forces, helicopters, anti-tank weapons, and combat-ready units.

### PERCEPTIONS OF STABILITY

It is often difficult to separate discussions about the balance and stability. In much of the Pact literature cited, the two tend to be intertwined. The state of the balance affects stability; the prospect of the balance altering in NATO's favor is perceived as destabilizing.

Interpretations of the open Pact discussions about the conventional situation should consider the context. Internal debates about military doctrine and East-West debates about the conventional situation and arms control are occurring simultaneously. It is likely that some of the open discussion is directed at particular audiences for largely political purposes.

Some of the aspects of the current conventional situation that the Pact seems to consider destabilizing and some proposals for increasing stability are presented.

<sup>48</sup>Nazarenko, 1988a, p. 34; and *Whence the Threat to Peace*, 1987, p. 74.

<sup>49</sup>Yazov, 1988, p. 20.

<sup>50</sup>Amirov et al., 1988, p. 386.

<sup>51</sup>Although this term is used frequently, it is not always defined. The Warsaw Pact Defense Ministers Committee, 1989, p. 2, defines "strike aircraft" as "bombers, fighter-bombers, ground-attack aircraft."

### Conventional Force Improvements and High Technology

NATO's emphasis on increasing and improving its conventional forces is characterized by Eastern spokesmen as destabilizing. An overall buildup in conventional arms is perceived as a "tangible threat to military-strategic stability."<sup>52</sup> Such a buildup is described as an attempt by NATO "to obtain military advantage"<sup>53</sup> over the Pact. Given the Pact's declarations of an overall balance in conventional forces, this interpretation is unsurprising.

Although a general increase in NATO's conventional capability worries the Pact, NATO's continued development of high-technology conventional weapons is of particular concern. NATO countries "have advocated an increase in the military potential of their alliance, the development<sup>54</sup> of new weapons systems based on modern technology for the sake of achieving military superiority over the Warsaw Pact."<sup>55</sup> The increased automation of weapon systems is characterized as destabilizing.

The use of automatic systems of troop and weapon management, the development of global inter-reconnaissance systems and integrated automatic "search and destroy" systems, the total mechanization and high mobility of troops and the use of military robots—[all these] result in more and more control functions passing from man to automatic devices. The quick development of hostilities, . . . swift advances by enemy troops, the spread of hostilities simultaneously over large areas in several European countries . . . all this prevents the political and supreme military command from sanctioning decisions due to shortage of time and information. In extreme cases, this could lead to an irreversible escalation of hostilities, including the use of tactical nuclear weapons.<sup>56</sup>

Potential loss of wartime control by leaders and uncontrolled escalation to nuclear use are not stabilizing prospects.<sup>57</sup> Kokoshin says, "Long-range precision-guided munitions, if they are adopted in forces

<sup>52</sup>Zhurkin, Karaganov, and Kortunov, 1987, p. 15.

<sup>53</sup>Semeyko, 1987, p. AA2. See also "It Is Up to the West's Political Will," 1987, p. AA7.

<sup>54</sup>Russian *razrabotka*.

<sup>55</sup>"It Is Up to the West's Political Will," 1987, p. AA7. See also *Whence the Threat to Peace*, 1987, p. 61.

<sup>56</sup>Shabanov, 1987, p. 89.

<sup>57</sup>There are two types of stability to consider here—prewar and intrawar. Although the loss of wartime control enhances prewar stability by increasing the risks and potential costs of going to war, such loss of control would undermine intrawar stability. The discussions about stability and instability, with the exception of the issue of loss of wartime control, seem to concentrate on prewar stability.

on a mass basis, will bring additional instability."<sup>58</sup> The improved range, power, speed, and accuracy of new conventional weapons increases their destructive capacity and seems to cause Pact leaders serious concern.<sup>59</sup> These considerations "inevitably [lead] to the conclusion that it is necessary to work out agreements that impose some reasonable limits on further qualitative modernization of conventional armaments."<sup>60</sup> The Pact's concern about Western high-tech has been noted by NATO observers as well. Snyder<sup>61</sup> and Sigal<sup>62</sup> document Pact trepidations about NATO's "emerging technologies." Rice notes that "Soviet leaders have an almost pathological respect for American technology."<sup>63</sup> Donnelly points out that

Technology has always assumed great importance in the eyes of Soviet military thinkers, due in no small part to Russia's traditional technological backwardness *vis à vis* the West. . . . It is not surprising, therefore, that Soviet military thinkers have been obsessed with technological innovation, fearing particularly the West's achievement of a technological breakthrough which would undermine their defense effort.<sup>64</sup>

Becker suggests that the Soviets' approach to conventional arms control might involve "retaining a sufficient quantitative margin while constraining the adversary's qualitative development."<sup>65</sup> Warner and Ochmanek suggest that the Soviets might seek an agreement that would limit qualitative improvements to NATO forces.<sup>66</sup>

A side effect of the improvement of high-technology weapons worries the Pact. "The destructive effects of a war with the use of conventional weapons have become virtually comparable to the consequences of nuclear war."<sup>67</sup> Kokoshin expresses concern about the effects of conventional weapons hitting nuclear or chemical weapon storage facilities.<sup>68</sup> Another major concern is the consequences of the destruction of European nuclear power plants by advanced conventional munitions. "Only a few artillery shells are needed to destroy one nuclear reactor

<sup>58</sup>Kokoshin, 1988b, p. 53.

<sup>59</sup>"Missiles, Tanks and Good Sense," 1988, p. 11, and Kokoshin, 1988b, p. 52.

<sup>60</sup>Amirov et al., 1988, p. 386.

<sup>61</sup>Snyder, 1988, p. 58.

<sup>62</sup>Sigal, 1987, p. 18.

<sup>63</sup>Rice, 1986, p. 315.

<sup>64</sup>Donnelly, 1981, p. 1595. Italics in original.

<sup>65</sup>Becker, 1987, p. 9.

<sup>66</sup>Warner and Ochmanek, 1989, p. 95.

<sup>67</sup>"Missiles, Tanks and Good Sense," 1988, p. 11. This concern is echoed by Kokoshin, 1988b, p. 52; and by Yazov, 1988, p. 18.

<sup>68</sup>Kokoshin, 1988a, p. 50.

and if it is destroyed by 'conventional' systems it must be regarded as a nuclear munitions explosion with all the consequences thereof."<sup>69</sup> This seems to suggest the possibility of uncontrollable nuclear escalation. The loss of escalation control is a destabilizing prospect.<sup>70</sup>

### Offensive Capabilities

One approach to increasing stability that is common to both East and West is to eliminate or reduce the potential for offensive operations by either side. General Chervov has suggested that the "military potentials of both groupings . . . must be cut, and the structures of their armed forces changed so that neither side holds the capability of attacking and carrying out offensive operations."<sup>71</sup> The idea of "nonoffensive defense" has received much attention in the Pact countries and is generally perceived as a means for increasing stability. "Strategic stability with reduced military confrontation could be achieved by each side's creation of expressly defensive forces and structures armed with the weapons that could not be used . . . for offensive operations."<sup>72</sup> Some sources have proposed specific types of weapons that should be removed under such a regime. One Polish plan suggests the reduction of "weapons of the greatest destructive power and accuracy which could be employed in offensive operations . . . for example, strike aircraft; tanks; armed helicopters; long-range artillery, including rocket artillery."<sup>73</sup> The Soviet Institute of World Economy and International Relations suggests not only types of weapons to be controlled but also a plan for restructuring existing forces:

[It] is necessary to give priority to the reduction of armaments with more clearly pronounced offensive functions: tanks, long-range artillery, tactical strike aircraft, tactical missiles, combat helicopters, and pontoon bridge facilities. More important than purely quantitative cuts is a restructuring of armed forces as reductions take place: disbanding some major armored and mechanized forces together with their logistics support units, air armies and missile groups, and redeploying others to areas farther removed from the forward edge so that they could perform the function of an operational reserve for the defense, and not that of an attack force.<sup>74</sup>

Such actions, it is argued, would stabilize the military situation in Europe

<sup>69</sup>Chernyshev, 1988b, p. 2.

<sup>70</sup>See footnote 57.

<sup>71</sup>"Chervov Describes Disarmament Strategy," 1987, p. 1. This proposal has been suggested widely. See, for example, Chernyshev, 1988b, p. 3; and Kokoshin, 1987, p. 3.

<sup>72</sup>Kokoshin, 1988b, p. 55.

<sup>73</sup>"Memorandum of the Government of the Polish People's Republic on Decreasing Armaments and Increasing Confidence in Central Europe," 1987, p. 36.

<sup>74</sup>Amirov et al., 1988, p. 390.

by reducing the quantity of weapons and decreasing the likelihood of offensive operations and thus increasing confidence on both sides.

### Surprise Attack Potential

One proposal suggested by Pact sources calls for stabilizing the balance by reducing the threat of surprise attack. Soviet leader Mikhail Gorbachev has suggested implementing measures that "would make it possible to lessen, or better still altogether exclude the possibility of a surprise attack."<sup>75</sup> The Warsaw Treaty Political Consultative Committee (PCC) favors an agreement that would, among other goals, lead to "the preclusion of sudden attacks."<sup>76</sup> The PCC considers measures "to reduce and eliminate the risk of a surprise attack . . . an integral part of the process of cutting back armed forces and conventional weapons in Europe."<sup>77</sup> The potential for surprise attack is perceived as very destabilizing. Kokoshin notes, "It is important to bear in mind that the requirements for achieving the element of surprise largely contradict conditions for ensuring strategic stability."<sup>78</sup> Many of the weapons considered high in offensive potential are also high in surprise-attack potential. The proposal made by former Polish head of state Jaruzelski suggests that to "eliminate weapons of sudden attack, the reduction of the following kinds of weapons is given priority: first strike assault aircraft, tanks, armed helicopters and conventional artillery and missile launchers."<sup>79</sup> Dual-purpose weapons are also perceived as being "exceptionally destabilizing in the military balance in Europe" because they are "especially useful for a sudden attack."<sup>80</sup> Reduction of the potential for surprise attacks in Europe by either side is perceived by the Pact as stabilizing to the European conventional balance.

### Quantity of Forces

Another stabilizing measure suggested by Pact sources is a general decrease in the number of weapons in central Europe. "The maintenance of the military balance at the lowest possible level is a most important

<sup>75</sup>Gorbachev, 1987, p. AA23.

<sup>76</sup>Warsaw Treaty Political Consultative Committee, 1988b, p. EE/0206/C/1. This general proposal, like the previous one, has been widely suggested. See, for example, *Whence the Threat to Peace*, 1987, p. 87; and Kokoshin, 1987, p. 3.

<sup>77</sup>Warsaw Treaty Political Consultative Committee, 1988b, p. EE/0206/C/1. See also Yazov, 1987, p. 21.

<sup>78</sup>Kokoshin, 1988b, p. 53.

<sup>79</sup>"General Staff Representative Talks About The Jaruzelski Plan," 1987, p. BII.

<sup>80</sup>Konarski, 1988, p. 51.



condition for ensuring security and peace."<sup>81</sup> A statement released from the Warsaw Treaty Political Consultative Committee states that "the priority objective of [conventional arms] talks should be to secure a radical reduction in the military potentials of both alliances. . . . This would enhance military-political stability and security in Europe."<sup>82</sup> One frequently mentioned first step in this process is the elimination of disparities between the two alliances in various categories of arms.<sup>83</sup> "It is a recognized fact that these disproportions exist," says Konarski, "and that they must be eliminated for the sake of military stabilization in Europe."<sup>84</sup> Although parity would be the goal of these reductions, "parity will not be able to ensure stability."<sup>85</sup> Most importantly, "raising the level of parity does not yield . . . greater security."<sup>86</sup> Achieving parity through buildups by the inferior side is perceived as a destabilizing solution. "It would not only be illogical, but even harmful, if individual inequalities were to be removed by introducing new kinds of weapons, or even by raising the armed forces' levels."<sup>87</sup> Increasing the number of forces in Europe is seen as destabilizing regardless of the goal. Kolikov notes, "Parity is not a goal in itself, however, but a means to ensure security. And a further increase in the level of parity, that is, a continuation of the arms race 'on equal terms' does not lead to greater security."<sup>88</sup> Like many NATO analysts, Pact observers have concluded that parity does not guarantee stability. Although there might be equality in numbers, those forces could still have the potential to undertake offensive operations and surprise attacks; this is viewed as destabilizing.

### Naval and Tactical Air Forces

NATO's supposed advantages in tactical air and naval forces are portrayed as destabilizing. The chairman of the Polish delegation to the Conference on Security and Co-operation in Europe (CSCE) states that "insofar as conventional weapons are concerned, the NATO tactical air

<sup>81</sup>Gareyev, 1988, p. 76.

<sup>82</sup>Warsaw Treaty PCC, 1988b, p. EE/0206/C/1.

<sup>83</sup>This suggestion is made by sources too numerous to list here. See, for example, "Memorandum of the Government of the Polish People's Republic," 1987, p. 37; and Tatarnikov, 1988, p. 5.

<sup>84</sup>Konarski, 1988, p. 51.

<sup>85</sup>Kokoshin, 1987, p. 3.

<sup>86</sup>Warsaw Treaty PCC, 1987b, p. BB20.

<sup>87</sup>Oprsal, 1987, p. 34.

<sup>88</sup>Kolikov, 1988, pp. 11-12.

force and navy are especially dangerous to the Warsaw Pact states."<sup>89</sup> "At the same time, a desire on the part of the NATO experts has been discovered not to include naval and air forces in the arms reduction process. This would give NATO unilateral advantages and would create a threat to the Warsaw Pact countries."<sup>90</sup> The combination of a perceived Western superiority in these two categories of forces and a Western desire to maintain that superiority is apparently seen as threatening to the Warsaw Pact countries. Additionally, some types of aircraft are considered destabilizing because of their offensive and surprise attack potential.

### **Military Doctrine**

Another stabilizing measure suggested by the Pact is a joint NATO/Pact discussion of military doctrine. Polish General Jaruzelski calls for

[j]oint actions which would ensure such an evolution of the nature of military doctrines that they could reciprocally be assessed as being strictly defensive. . . . A joint discussion and comparison of military concepts and doctrines and an analysis of their nature and development trends could prove helpful.<sup>91</sup>

Yazov suggests "comparing military doctrines and discussing 'imbalances' at the level of experts."<sup>92</sup> Pact observers portray NATO's military doctrine as destabilizing.

[T]he "airland battle" concept adopted by the Pentagon in 1982 outlines the use of general-purpose major field forces and formations in combat operations, primarily in the European theater. The concept provides for a surprise joint launch of hostilities by ground, air, and naval forces applying the latest means of warfare to defeat enemy troops, achieve an overwhelming superiority over the enemy, and capture its territory in a decisive offensive.<sup>93</sup>

General A. I. Gribkov, chief of staff of the Warsaw Pact Joint Armed Forces, claims NATO's Follow-on Forces Attack (FOFA) concept "is aimed at depriving the Warsaw Pact of the ability to repulse aggression. It is entirely based on calculated surprise, which cannot be achieved without a first strike."<sup>94</sup> These major aspects of NATO's doctrine are con-

<sup>89</sup>Konarski, 1988, p. 50.

<sup>90</sup>"Chervov Describes Disarmament Strategy," 1987, p. 1. See also Yazov, 1988, p. 19.

<sup>91</sup>"Memorandum of the Government of the Polish People's Republic," 1987, p. 36.

<sup>92</sup>Yazov, 1988, p. 21.

<sup>93</sup>*Whence the Threat to Peace*, 1987, pp. 15-16.

<sup>94</sup>Gribkov as quoted in Kosarev, 1987, p. 5.

sidered "openly offensive."<sup>95</sup> Marshal Kulikov, commander in chief of the Warsaw Pact Joint Armed Forces, says that NATO's concept of "combat against follow-up echelons" . . . is an aggressive concept, because the surprise factor is its crucial element, which cannot be utilized if you do not attack first. This is precisely what NATO is preparing for."<sup>96</sup> Warsaw Pact military doctrine, the Pact claims, is strictly defensive. The PCC states, "The military doctrine of the Warsaw Treaty member states is strictly a defensive one. . . . The Warsaw Treaty member states will never, under no circumstances, start hostilities against any country or an alliance of countries, unless they become the target of an armed attack themselves."<sup>97</sup> The Pact's military doctrine, Kulikov claims, "has an exclusively defensive character."<sup>98</sup> Offensive operations, however, still appear to be a part of the Pact's defensive doctrine. Gribkov states, "While repulsing the aggression, [Pact forces] will also conduct counteroffensive operations. This does not contravene the demands of the military doctrine, since . . . such actions are not only possible but necessary within the framework of defensive operations."<sup>99</sup> The Warsaw Treaty foreign ministers propose "a comparison of military doctrines, taking military-technical aspects into account, with a view to giving the military doctrines and concepts of the two military alliances and their participants a strictly defensive thrust."<sup>100</sup>

### Sufficiency and Defense Dominance

Stability in Europe would be enhanced, Pact observers claim, by the implementation of the related concepts of "defense dominance" and "sufficiency." The basic tenet of sufficiency calls for possession of only enough military force "as is indispensable for effective defence."<sup>101</sup> Gorbachev has suggested that "the Soviet Union is willing and ready to . . . reduce [nonnuclear] armaments to a minimum reasonable amount."<sup>102</sup> Zhurkin et al. say that "the level of reasonable sufficiency as applied to conventional armed forces must be determined not by the ability to win a major local conflict but by ensuring an adequate defence

<sup>95</sup>Kokoshin, 1988b p. 55.

<sup>96</sup>Kulikov, 1987, p. 3.

<sup>97</sup>Warsaw Treaty PCC, 1987b, p. BB19.

<sup>98</sup>Kulikov, 1987, p. 3.

<sup>99</sup>Gribkov as quoted in Kosarev, 1987, p. 7.

<sup>100</sup>"Appeal to the NATO Member States and All Countries Participating in the Conference on Security and Co-operation in Europe," 1988, p. EE/0115/C/1.

<sup>101</sup>"Memorandum of the Government of the Polish People's Republic," 1987, p. 36. See also Tatarnikov, 1988, p. 5.

<sup>102</sup>Gorbachev, 1987, p. AA23.

potential."<sup>103</sup> Yazov claims that the Soviet Union "is building its armed forces on the principle of adequacy for defence."<sup>104</sup> Leaving both sides forces sufficient for defense but insufficient for offensive operations or surprise attacks would increase stability and security in Europe, according to the Warsaw Treaty PCC.<sup>105</sup> Such "nonoffensive defenses" complement the idea of defensive dominance. Under this concept, the defensive potentials of each side would be greater than their opponent's offensive potentials. That, it is argued, would increase stability because neither side would need to fear any offensive operations by the other side. Kokoshin suggests that

One of the main principles of creating an essentially new system of strategic military balance at the conventional level boils down to the following: The Warsaw Pact's defensive capabilities must substantially exceed NATO's offensive capabilities, while NATO's defensive capabilities must substantially exceed the Warsaw Pact's offensive capabilities.<sup>106</sup>

This new system of security would replace the current and less stable one in which both sides seem to fear offensive operations and surprise attacks from the other side.

There is an internal debate going on in the Soviet Union between the military and some civilians about sufficiency and how that concept should be defined. The open debate is almost certainly being conducted on at least two levels: one relating to the defense policy formulation process within the Soviet Union and the other relating to Western governments and public opinion.

### Summary

The Pact's worries about stability seem to be concentrated on three major concerns. One is the possible loss of control over events in the battle. Their worries about a high technology arms race, the increasing role of automation in conventional weapons, and the probable destructiveness of a conventional war using these munitions seem to stem in part from fears of loss of control over the battle by their leaders and of uncontrollable escalation, possibly to nuclear use, during a conflict. This prospect seems to be perceived as a very destabilizing one. Their second main concern seems to be about getting into an arms race in high technology weapons, an area where they are at a comparative disadvantage. Their apparent anxiety about Western technology seems to bring up fears that

<sup>103</sup>Zhurkin, Karaganov, and Kortunov, 1987, p. 15.

<sup>104</sup>Yazov, 1988, p. 21.

<sup>105</sup>Warsaw Treaty PCC, 1988b, p. EE/0206/C/1.

<sup>106</sup>Kokoshin, 1988b, p. 55.

they will not be able to keep up in that area if a full-scale arms race were to occur and that the balance would then tip in the West's favor. Their third serious concern is the perceived capability of NATO forces to launch offensive operations in general and surprise attacks in particular. This prospect is considered destabilizing because it would take the initiative, and thus a large amount of control, away from their leaders and because the conflict might be taken to Warsaw Pact territory.

The political context in which these concerns are voiced is again worth noting. The internal debates over doctrine and sufficiency and the external debates over future arms control talks and the character of those talks can complicate the interpretation of Pact statements. It is unclear whether and to what degree statements about instability and Western superiority in some areas of the conventional balance are real concerns, are designed to address internal debates, or are propaganda designed to exploit Western fears or political differences or to play to the Western left.

## **IV. THE BALANCE AND STABILITY ASSESSMENT—A NEW APPROACH**

### **CONVENTIONAL STABILITY**

As suggested earlier, conventional stability exists when there is a balance of conventional capabilities such that both sides believe that (1) neither side can launch a successful attack against the other, and (2) either side can successfully repel any attack launched by the other. This definition obviously implies that conventional stability consists of two facets, one based on offense and one based on defense.

#### **Offensive Stability**

Offensive stability would exist if neither side believed it could successfully attack the other. Each side would consider what its objectives would be if it were to attack the other side. For example, one side's objective might be to gain at least 70,000 km<sup>2</sup> of territory or to penetrate an average of 200 km beyond the common border. If neither side believed its objectives could be achieved by attacking, then the situation would be conventionally stable from an offensive perspective.

The offensive potential of the attacking forces must be weighed against the defensive potential of the defending forces to determine the probable outcome of a confrontation. If one side's offenses clearly dominated the other side's defenses, that could cause offensive instability.

#### **Defensive Stability**

Defensive stability would exist if each side believed it could repel any attack launched by the other side. Each side would consider what the likely outcome would be if it were attacked by the other side and how that outcome compared with its defense objective. For example, an objective for the defender might be to allow no penetration by the enemy into the defender's territory or perhaps to allow some minimal penetration but then to counterattack and push the attacker back to prewar borders. If both sides believed their defense objectives could be met if they were attacked by the other side, then the situation would be conventionally stable from a defensive perspective.

Superiority of each side's defenses over the offenses of the other side is required for defensive stability. This situation is called "defense dominance."

Although both defensive stability and offensive stability must be present for conventional stability to exist, defensive stability is a more secure form of stability than offensive stability. In an offensively stable situation, the attacker believes that he cannot attack and achieve his objective; however, his attack might gain him some of the defender's territory. This is obviously an undesirable situation from the defender's perspective. If the attacker suddenly adopts a more modest objective, the situation could quickly become offensively unstable. Since offensive stability is based on the denial of some postulated attack objective, a change in the objective could easily endanger that stability.

Defensive stability, however, is based on the ability to defend against any possible attack and not to allow an attacker to gain any territory. In this case, a change in the attacker's objective would not affect the defender's perception of the situation. If the situation is defensively stable, the defender would be confident of his ability to defend against an attack and to maintain territorial integrity. The situation would continue to be defensively stable regardless of changes in the attacker's objectives.

The concept of conventional stability suggested here differs somewhat from the concept of stability used in the nuclear arena. Offensive conventional stability is based on neither side being able to attack and gain a sufficient amount of the other's territory. There is no incentive for either side to attack because neither side could meet its objective. First strike stability in the nuclear arena is based on a condition in which each side *can* inflict quite a bit of damage on the other. There is no incentive for either side to attack, not because they could not inflict sufficient damage but because the attacking side could also incur substantial damage from a retaliatory strike. The offensively stable conventional situation is stable because each side *could not* achieve its objective if it attacked the other side. A stable nuclear situation is stable because both sides *could* achieve a lot of damage against the other.

Defensive stability, however, applies in both the nuclear and conventional realms. The introduction of ballistic missile defenses and air defenses could allow a defender to thwart a nuclear attack. Sufficiently effective defenses can create defensive stability in the nuclear arena just as they could create defensive conventional stability. The calculation of both nuclear and conventional defensive stability is based on the defender's assessment of his ability to defend himself against any enemy attack.

## **PERCEPTIONS OF CONVENTIONAL STABILITY**

NATO and the Pact have different perceptions regarding what would increase or decrease stability in Europe. What is actually meant by "stability" is not always clear. Moreover, most of these perceptions and concerns are focused on only one aspect of conventional stability or on small parts of overall force structures.

### **Numbers of Weapons**

Both NATO and the Pact are concerned about the numbers of weapons in Europe. Although the two do not always agree on who has more of what, they both perceive the large asymmetries in numbers of weapons as destabilizing. However, it is not the actual numbers of weapons that affect stability, or even imbalances in their numbers, but rather their contribution to overall capability. Obviously, the quantity of weapons does directly affect the outcome of a conflict fought with those weapons; however, quantity is not the only factor to be considered. Reducing the number of weapons or achieving numerical parity in Europe will not necessarily create a more stable situation. The cumulative capabilities, both offensive and defensive, and the combat outcomes they lead to are the factors that affect conventional stability.

### **Qualitative Improvements**

The Pact is worried about the destabilizing effects of qualitative improvements in NATO's forces, particularly NATO's emphasis on high technology. This concern is at once too narrow and too broad. It is too broad because some improvements and advances in technology will increase defensive capability, which increases conventional stability; not all high technology should be written off as destabilizing. It is too narrow because focusing only on the qualitative aspects of forces, like focusing only on quantities of weapons, ignores the contribution of other factors to overall capability and combat outcomes. It is the total capabilities and the outcomes that really determine whether conventional stability exists.

### **Force Posture**

NATO considers the Pact's force posture to be offensive and thus destabilizing. This concern looks at only part of the offensive aspect of stability. Whether the Pact would be able to meet its attack objectives is ignored. Defensive stability is not specifically considered. Although NATO's ability to defend against a Pact attack is considered implicitly



in that concern, possibilities for altering NATO's capabilities so that they can more effectively defend against but cannot conduct large-scale offensive operations are not explicitly treated.

Pact suggestions that "sufficiency" in forces would stabilize the conventional situation in Europe are probably unrealistic. It is debatable whether there is actually some level and structure of forces that would allow either side to defend but neither side to attack successfully. The two sides would probably disagree on what is sufficient, and even different factions within NATO or the Pact would probably disagree on "sufficiency" among themselves. Such a force posture would enhance both offensive and defensive conventional stability. True defense dominance, where the defenses of each side are stronger than the offensive capabilities of the opposing side, would allow both sides to repel any attack and so would create a conventionally stable situation.

### **Attack Scenarios**

Both sides are concerned about short-warning attack scenarios. This concern does involve both the offensive and defensive aspects of conventional stability. NATO and the Pact both seem to fear their enemy's ability to launch such an attack successfully and to doubt their ability to defend against it. However, concern about the short-warning attack overshadows the other possible scenarios. A posture that allows the defender to thwart a short-warning attack might not be suitable for defending against other kinds of attacks. For example, a posture with many ready NATO forces stationed far forward in Europe but with few available reserves might be able to thwart a Pact short-warning attack. However, it might not be able to defend for long if the Pact decided to take longer to mobilize. The forward forces could eventually be attrited or penetrated and encircled, and with very few NATO reserves, the Pact could take most of western Europe with little opposition. Eliminating the threat of a short warning attack might increase conventional stability, but it would not guarantee a conventionally stable situation.

### **Doctrine**

Both sides consider aspects of the other's military doctrine destabilizing. Although both say their doctrine is strictly defensive, they consider the other alliance's doctrine to be offensively oriented. Changes that would convince NATO and the Pact that their adversary's doctrine is strictly defensive would not hurt stability but might not enhance it much either. As noted previously, conventional stability should be based on

capabilities and the outcomes likely to result from those capabilities. Doctrine and intentions can change too quickly; stability cannot be based on those alone.

### **Summary**

Many of the concerns voiced in the stability debate are too narrow. They do not address both the offensive and defensive aspects of conventional stability, or they address them incompletely. Addressing only the particular concerns mentioned above would not necessarily bring about conventional stability. Increasing the defensive capability and decreasing the offensive potential of forces on both sides—if it could be done—would allay most worries about stability and would increase progress toward conventional stability. Such changes would probably allow decreases in the total size of forces on both sides and would certainly change their character. They would also be likely to make a successful short-warning attack less probable.

### **THE NEED FOR A NEW APPROACH**

An approach that integrates force capabilities, combat outcomes, and conventional stability is needed. It should use the capabilities to determine the probable results of a conflict under a range of assumptions. It should be able to assess the effects of changes in capabilities, such as those resulting from force improvements or arms control proposals, on conventional stability. It should be readily usable for sensitivity analysis to check the effects of changes in the scenario on the combat outcomes. It should be able to assess progress toward a capability to achieve defense objectives. Such a framework would help to unify defense objectives, force planning, and arms control policy.

### **A NEW FRAMEWORK**

A framework that might fit these requirements is suggested below. It consists of three basic parts: measures of military capabilities, measures of effectiveness, and assessment methodologies.

#### **Measures of Military Capability**

The first part of the framework consists of measurements of military capabilities. Some measure of the military potentials of both sides

must be chosen. One category of possible indices is the static balance measures discussed earlier. One might, for example, measure combat potential in terms of the number of tanks or number of combat aircraft that each side has. As indicators of combat capability, most static measures are too narrow. They consider only one contributor to overall combat potential. If the number of tanks, for example, is chosen as the metric, the contributions of other weapons, such as aircraft, artillery, and anti-tank weapons, are left out. Additionally, the quality of the different types of weapons is ignored. Simple numbers of weapons really are not good indices of total military potential. The number of divisions would be a better indicator, but even that is insufficient. Aggregate counts of divisions might not be indicative of combat potential because of differing size and composition of different types of divisions. Since an assessment of conventional stability is based on general military capabilities rather than on particular weapon systems or types of weapons, static measures are inadequate as measurements of total military potential.

Another category of possible indices of combat potential is weighted static measures. For example, military capability can be assessed using armored division equivalents (ADEs), equivalent tanks (i.e., number of tanks weighted relative to some standard tank), or heavy division equivalents (HDEs).<sup>1</sup> Weighted measures that use only one type of weapon system (equivalent tanks or aircraft, for example) are unsuitable as measures of general combat capability for the same reasons static measures are unsuitable. Weighted unit indices, such as ADEs or HDEs, are preferable. These measures integrate many different kinds of capabilities and thus give a better idea of overall combat potential than static counts or weighted weapon counts. Quality of weapons can be considered, and differing size and composition of units can be accounted for. Weighted unit measures are often biased in favor of one type of unit (heavily armored units, for example). However, since they are better indicators of overall military capabilities than static counts or weighted weapon counts, weighted unit indices are preferable for use in assessing conventional stability.

In the following description and application of the framework, ADEs will be used as the measure of combat capability for both sides. Other weighted unit measures would probably serve equally well. They all have different advantages and disadvantages. ADEs were chosen primarily because they are more widely used than the others. The

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<sup>1</sup>An explanation of the heavy division equivalent measure of capability can be found in Hamilton, 1985, p. 135.

assumed current balance of ADEs in central Europe is 61 for the Pact and 37 for NATO.<sup>2</sup>

### Measures of Effectiveness

The second part of the framework is the measure of effectiveness (MOE), which should be chosen so that the effects of changes in military capabilities on military objectives and on conventional stability can be assessed. There are many possible MOEs. A representative set of potential MOEs and their utility for measuring movement toward objectives and changes in conventional stability are discussed below.

One possible MOE is the force ratio between the two sides. For a given set of scenario assumptions, this can be measured at any point during mobilization or projected for periods after the conflict has begun. Force ratio as an MOE is supposed to be a proxy for how well the defense has held and how well it is expected to hold in the future. If the force ratio is high in the attacker's favor, the defense has probably either been badly beaten previously or will be in the future. Use of only the force ratio as an MOE masks the important issue of territorial position. Even if the force ratio is highly favorable to one side, that side might have already lost much of its territory. Whether conventional stability has been achieved depends on the two sides' progress toward their objectives. These objectives, at least in the central European theater, are likely to involve some metric of territory taken or protected, so measuring force ratio alone is probably insufficient to assess progress toward conventional stability.

Another potential MOE is the maximum territorial penetration achieved by the attacker. Although a conflict would probably be fought over a large geographical area (e.g., along the length of the inter-German border), the attacker would probably not move uniformly into the defender's territory along the entire border. The attacker would be likely to penetrate further in some places than in others. The maximum penetration would be measured in the place where the attacker had penetrated the farthest. This measure is useful for indicating where weaknesses in defenses are located; however, it is not a good indicator of the overall success of an attack unless the objective of the attack is to secure one particular area. Maximum penetration gives an overly optimistic assessment of the attacker's situation by showing the area where progress is the best. It also gives an overly pessimistic assessment of the defender's situation by showing the area where the

<sup>2</sup>Mako, cited *ibid.*, p. 115. The numbers cited are the numbers of ADEs that would be available to the two sides by the end of a 30-day conflict after 5-10 days of mobilization. Mako's book was published in 1983, so the figures might be somewhat dated.

defense has been the worst. Consider a case where the Pact attacks NATO and penetrates 200 km into the north part of the FRG but makes no progress in the central and southern areas. Using maximum penetration as a measure of effectiveness for the attacker would overstate progress. Although some was made in the north, the attacker has made none in other areas. Similarly, the defense, though weak in the north, has held well in the center and in the south. That should be considered when assessing the overall effectiveness of the defense. Maximum penetration focuses on one particular area rather than on the whole theater and is thus likely to be an inadequate indicator of progress toward conventional stability when used alone.

A third potential MOE is the number of days a cohesive defense is held. There are two important problems with using this MOE alone. First, the definition of "cohesive" is obviously open to interpretation. However, even if "cohesive" is satisfactorily defined, the issue of territorial integrity is ignored. The enemy could be taking a lot of territory, forcing the defense to retreat continually, but the defense might still be considered cohesive and thus the defense's objective would be achieved. Clearly, this is an extreme and not very realistic case. However, it illustrates one potential difficulty if a defense objective is chosen without including some consideration of territory lost. When assessing conventional stability, this MOE, like the force ratio metric, is unsuitable for use alone.

Another candidate MOE is the average territorial penetration by the attacker. This MOE can mask defender weaknesses in specific areas. However, it gives a good idea of both defensive and offensive effectiveness. A large penetration in one area will show up as an increase in the average, but such a penetration will not skew interpretation of the results as much as it would using the maximum penetration MOE. Since territorial gain or loss is likely to be a part of most objectives, this MOE would be useful in determining the progress toward those objectives and thus toward conventional stability.

In the following description and application of the framework, average penetration will be used as the measure of effectiveness. This MOE is measured 30 days after the beginning of the conflict.<sup>3</sup> Which MOE is appropriate depends on the objectives of the two sides. Since NATO's objective is a successful defense of West Germany far forward, average territorial penetration is an appropriate MOE for NATO. Although the objectives attributed to the Pact are conjectural, it seems reasonable that the average territory lost or gained would be of

<sup>3</sup>Thirty days is the NATO planning number for sustainability. North Atlantic Assembly, 1984b, p. 14.

importance to them as well. Changes in the average territory gained by the attacker as a result of changes in military capabilities will indicate movement with respect to these objectives and the resulting effects on conventional stability.

Different MOEs might be more appropriate given different objectives. If the defense of one particular area is the defender's objective, maximum penetration or actual penetration along one axis of attack might be better MOEs than average territory lost. There are many possible objectives and at least as many MOEs. More than one MOE might occasionally be useful. Some changes in capabilities might improve one MOE at the expense of another.

### **Assessment Methodologies**

The final necessary part of the framework is the methodology used to estimate the MOEs. The assessment technique takes as inputs the measures of military capability and generates the measure(s) of effectiveness. As discussed in Sec. II, there are four categories of assessment techniques. The first two are static and weighted static counts. The outputs of these methodologies are more appropriate for estimating the military capabilities of the two sides. They do not capture differences in conflict scenarios such as different mobilization times. They do not reflect changes over time resulting from mobilization or conflict, nor do they capture the effects of the broad range of combat phenomena such as C<sup>3</sup>I, logistics, air power, and tactics. Most important, static methodologies do not provide outcomes of a simulated conflict and therefore do not generate any of the interesting measures of effectiveness. Unless a side's objective is to have some particular number of weapons, the outputs of static and weighted static techniques will not be of use in determining progress toward that side's objective and thus toward conventional stability.

The third category of assessment methodologies is the buildup rate techniques. Assessments done using these methodologies are useful only if a side's objective is to achieve a certain force ratio or number of weapons by some point in time. Buildup rate techniques do not account for changes in forces resulting from combat and do not capture many important combat phenomena such as C<sup>3</sup>I, logistics, and tactics. Like static techniques, they do not generate most of the interesting MOEs. Progress toward defense objectives and conventional stability cannot usually be gauged using the outputs from buildup rate assessments since they do not generate combat outcomes.

The last category is dynamic assessment methodologies. Because these techniques produce combat outcomes, they are more suitable for

generating MOEs and for measuring movement toward objectives. War games involving human players are not really meant to be used as balance assessments. Their lack of reproducibility makes them not readily usable for generating MOEs, and sensitivity analyses cannot be easily done using such games. Although equation-based models can be used for sensitivity analysis, they often do not capture such phenomena as C<sup>3</sup>I, logistics, tactics, and differences in terrain. Those factors can seriously affect combat outcomes, so they can change progress toward defense objectives and should not be ignored. Dynamic simulations are probably the best alternative. They provide a range of combat outcomes for use as MOEs and can be easily used for sensitivity analysis. They can assess how outcomes change over time because of ongoing combat, and they can account for combat phenomena that other assessment methodologies frequently ignore. However, human factors are often not included in dynamic simulations, and the large number of assumptions and parameters needed in simulations makes them very complex. Single answers produced by simulation models should not be taken as truth. A reasonable set of base case simulation outputs should be achieved, and the trends in these outputs resulting from changes in capabilities should be assessed. As long as the limitations of simulations are recognized, they can be very useful in assessing movement toward defense objectives and conventional stability.

Decisions regarding the conflict scenario must also be made. The extent to which scenario variables can be set or changed and the number and nature of the decisions depend on the particular assessment methodology chosen. Such variables as the number of days of mobilization each side has before conflict, the rates of attrition, the attacker's operational plan, the readiness of prepared defenses, and the condition of the terrain might have to be considered.

### **The Framework**

These three elements—the measures of military capabilities, the measure of effectiveness, and the assessment methodology—are combined to produce a stability assessment framework. The measures of military capability are used as inputs to the assessment methodology, which generates the MOEs. Figure 7 shows the graphical framework. The measures of military potential of the two sides (ADEs) are placed along the horizontal (NATO) and vertical (Pact) axes. Points A and B are the hypothetical results of Pact attacks against NATO at two different levels of military capabilities. Point A represents capabilities of 36 NATO ADEs and 61 Pact ADEs. If a simulation were run with

these levels of capabilities, an MOE of 50 km might be the result.<sup>4</sup> In this example, the MOE indicates the average territorial penetration achieved by the Pact. Point B represents capabilities of 29 NATO ADEs and 49 Pact ADEs and an MOE of 100 km.

If one could find a comprehensive and objective combat simulation (i.e., one that models all aspects of war accurately without favoring either NATO or the Pact), it could be used to determine the outcomes of conflicts with different input levels of capabilities. Because this simulation would be comprehensive and objective, so would its results. Those results would presumably reflect "truth"—i.e., what would happen if war were actually to occur.

Such an ideal simulation is probably unattainable and it is necessary to hypothesize what "true" results might look like. Figure 8 shows

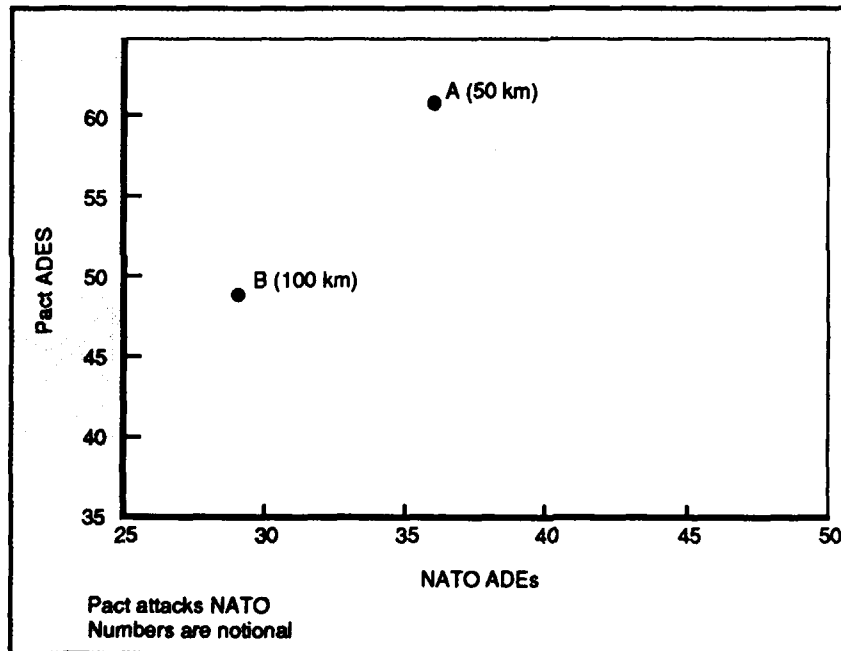


Fig. 7—The framework

<sup>4</sup>The numbers shown in Fig. 7 are not the results of actual simulation runs; they are presented for illustrative purposes only.



some hypothetical "true" results. The horizontal and vertical axes show NATO and Pact ADEs as the measure of military capability. Each curve in Fig. 8 represents several points where differing levels of input military capabilities generated the same value of the measure of effectiveness. Figure 8a shows some notional "true" outcome curves for a scenario where the Pact attacks NATO. Point C in Fig. 8a, for example, is at 32 NATO ADEs and 58 Pact ADEs and represents an MOE of 100 km average loss of NATO territory. Consider how the MOE might change if levels of military capability changed. If some capability were taken away from *only* the Pact, for example moving from point C to point E, one would expect the Pact not to gain as much territory. But if some capability were taken away from NATO as well, perhaps moving to point D, NATO would have fewer forces to defend with and would probably lose more territory than it does at point E. Moving from point C to point D, both sides lose some capability, so there might not be any change in the MOE; NATO has less force to defend with, but the Pact has less to attack with. So the curve connecting points C and D is the set of levels of NATO and Pact military capabilities where the MOE does not change. The average penetration by the attacker is the same at all levels of capability along that curve. A curve along which the military capabilities of the two sides change but the measure of effectiveness does not change is called an *iso-MOE curve*. Curves for two different scenarios are presented in Fig. 8. The curves in Fig. 8a assume a Pact attack against NATO. These curves have positive and increasing slope. The positive slope follows from an assumption that for each ADE added by the defender, the attacker must add more than one ADE to take the same amount of territory. In other words, one extra ADE buys the defender more leverage than it buys the attacker. Conventional wisdom suggests that the attacker usually suffers higher attrition than the defender. The defender can prepare his defensive positions. Although the attacker can choose the place and time of the attack, he must expose his forces in order to attack, and so suffers higher attrition. If the defender adds one ADE to his forces, the attacker must add more than one ADE to compensate for the differential attrition and to gain the same amount of territory.<sup>5</sup>

The increasing slope of the lines indicates a decreasing return on additional ADEs for the attacker as the defender adds more forces. For example, assume that the defender has added one ADE and that

<sup>5</sup>This assumes that the defender uses the extra forces in an effective manner. He could obviously not commit the extra forces or could commit them where they are not needed, but it is reasonable to assume that the forces would be used where they would do some good.

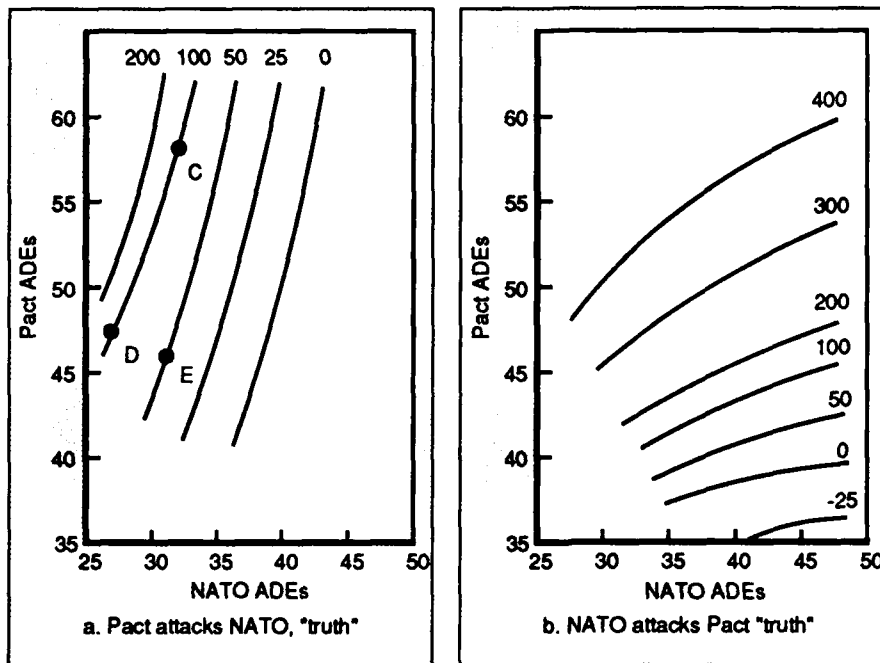


Fig. 8—A set of iso-MOE curves  
(Curves are notional)

the attacker had to add three ADEs to achieve the same territorial penetration. However, if the defender adds two ADEs, then the attacker might have to add seven ADEs to achieve the same effect. Two phenomena are potentially at work here. First, as the defending forces become denser, it becomes harder and harder for the attacker to eject them from their defensive positions. Second, the attacker could be getting less return on his added ADEs because of shoulder space constraints. Attacking forces can be packed only so tightly across the front; eventually, additional forces will not fit and thus will not help much.

Moving from right to left in Fig. 8a, the removal of one NATO ADE has an increasingly larger negative effect on NATO's ability to defend.<sup>6</sup> As the absolute level of NATO forces gets lower, one ADE is a greater

<sup>6</sup>Positive numbers on the MOE curves indicate penetration into NATO territory. Negative numbers indicate penetration into Pact territory.

percentage of its capability, and its loss thus has a larger negative effect on NATO's ability to defend. NATO's forces are spread thinner and eventually become unable to defend cohesively. Figure 8a does not show any penetration into Pact territory because NATO's objective as a defender is to restore prewar borders.

Figure 8b shows notional curves for a case where NATO attacks the Pact. While the Pact is defending, it has the advantages inherent to the defense; so when it adds one ADE, NATO must add more than one to take the same amount of territory. Therefore the curves where the Pact is defending are nearly horizontal. MOEs shown (400, 300, 200, etc.) represent Pact intrusions into NATO territory, because the Pact's defensive strategy involves counteroffensives designed to take the war onto the aggressor's territory.

As the Pact becomes the attacker, it loses the defender advantages. Addition of one ADE by the Pact can be compensated for by addition of fewer NATO ADEs as NATO is now on the defensive. The curves where the Pact is counterattacking therefore gradually begin to slope upward.

At most of the levels of capability shown in Fig. 8, NATO is shown doing worse if it attacks than if the Pact attacks. At first, this might seem counterintuitive. The attacker has the initiative and therefore might be expected to do better than if he is attacked. But conventional wisdom also says that the attacker takes higher attrition than the defender. Additionally, NATO's forces are deployed and trained for defense. It is reasonable to argue that NATO would therefore be less effective on offense than on defense. Its forces would suffer considerable attrition on the initial attack and would be less able to defend. The Pact would counterattack and might very well do better than if it had attacked first.

Iso-MOE curves can be used to assess how changes in capabilities affect a side's status with respect to its objectives. Take, for example, NATO's objective of a conventional defense far forward. If no Pact penetration into NATO territory is to be allowed, that objective would correspond to the 0 km line in Fig. 9. If point X is the current state, moving to point Y, which represents an increase in NATO capabilities but no increase in Pact capabilities, would move NATO closer to its forward defense objective. The additional forces would make NATO more able to defend. Point Z represents a decrease in the capabilities of both sides that makes NATO worse off with respect to its objective. Point W also represents mutual decreases in capabilities from point X but moves NATO closer to its objective. As this figure helps to illustrate, although some mutual decreases in capabilities might move NATO closer to its objective, some mutual force reductions could make NATO worse off.

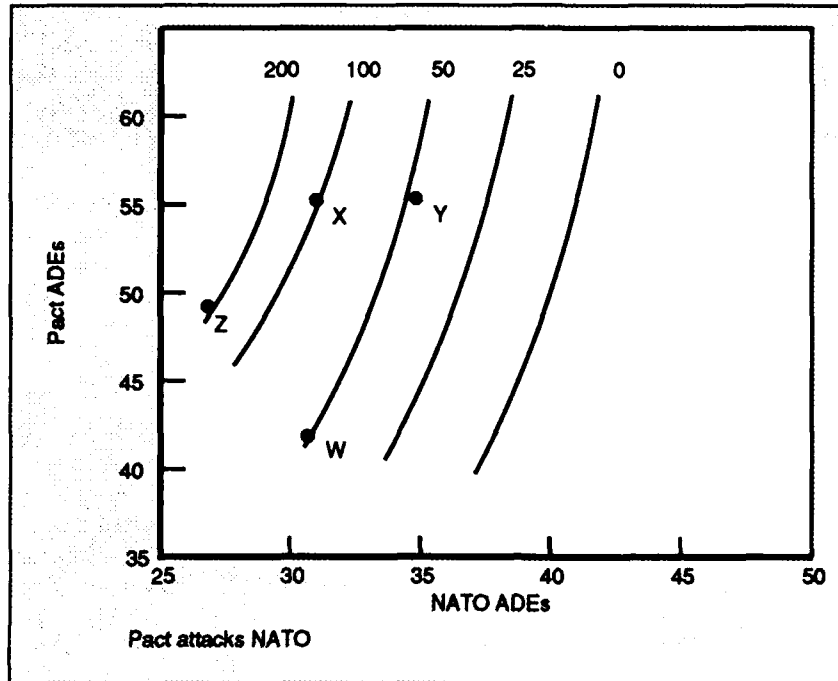


Fig. 9—Changing capabilities and MOEs  
(Curves are notional)

## AN APPLICATION—STABILITY ENHANCEMENT IN EUROPE

### Shifts Due to Perceptions

The approach as suggested so far seems straightforward. Quantifiable inputs are fed into objective numerical methodologies, and the resulting measures of effectiveness are determined. The numerical measures of military capability are important parts of balance assessments; however, they are not the only factors to consider. Perceptions might introduce sizable distortions in one's assessment of another side's capabilities and in estimates of the effects of those capabilities. How each side judges its military potential relative to that of the other side is critical.

Perceptions about the balance were discussed in two earlier sections. Those discussions provided some evidence that both NATO and the Pact are cautious, perhaps even pessimistic, about their own capabilities relative to those of the other side. In any given situation, then, NATO's *perceived* outcome would differ from the "true" outcome (where "truth" is the outcome of a "perfect" simulation), and both would differ from the Pact's *perceived* outcome.

In the iso-MOE framework, this means that two additional sets of curves are required: one for the Pact's and one for NATO's perceived results. Consider a scenario where the Pact attacks NATO. Figure 10 shows three sets of iso-MOE curves for this scenario, one each for the "truth," NATO's perception, and the Pact's perception. Figure 10a shows the postulated "true" curves from Fig. 8 for the case where the Pact attacks NATO. Figure 10b shows how those curves might shift according to NATO's perception. All but one of these curves are produced from the results of the CAMPAIGN combat simulation model;<sup>7</sup> the 0 km curve is extrapolated.<sup>8</sup> Figure 10c shows a postulated set of curves that might result from the introduction of Pact perceptions.

The introduction of NATO's perceptions changes the curves in two ways. First, because NATO is pessimistic about its capabilities, NATO's perceived outcome at any given level of capability would be worse for NATO than the "true" outcome. For example, point M on Fig. 10a shows the "true" outcome of 25 km gained by the Pact at a level of capabilities of 39 NATO ADEs and 60 Pact ADEs. Point N on Fig. 10b is also at 39 NATO and 60 Pact ADEs, but it shows an average Pact gain of 75 km of NATO territory. At any given level of capabilities for NATO and the Pact, NATO perceives a greater territorial gain for the Pact than is indicated on the "truth" graph.

In addition to shifting the curves to the right, NATO's pessimism causes any two curves representing the same MOEs to be further apart than they are on the "truth" graph. Although NATO believes that one extra ADE will help increase its defense capabilities, it *perceives* that that extra ADE will have less of an effect than it really would. For example, the 0 and 25 km curves in Fig. 10b are farther apart than

<sup>7</sup>These curves (with the exception of the 0 km curve) were generated using data presented in Thomson and Gantz, 1987, pp. 8, 11. See the appendix. The CAMPAIGN combat simulation was developed as part of the RAND Strategy Assessment System. For more information about the model, see Bennett et al., 1988.

<sup>8</sup>The particular cases run using the CAMPAIGN simulation did not produce an outcome of no Pact gain of NATO territory. The 0 km curve is extrapolated from the data in the appendix. It is assumed that this curve is roughly the same shape as the curves generated using the simulation output. This assumption, the data in the appendix, and the effects described in the following two paragraphs were combined to produce the hypothetical 0 km curve.

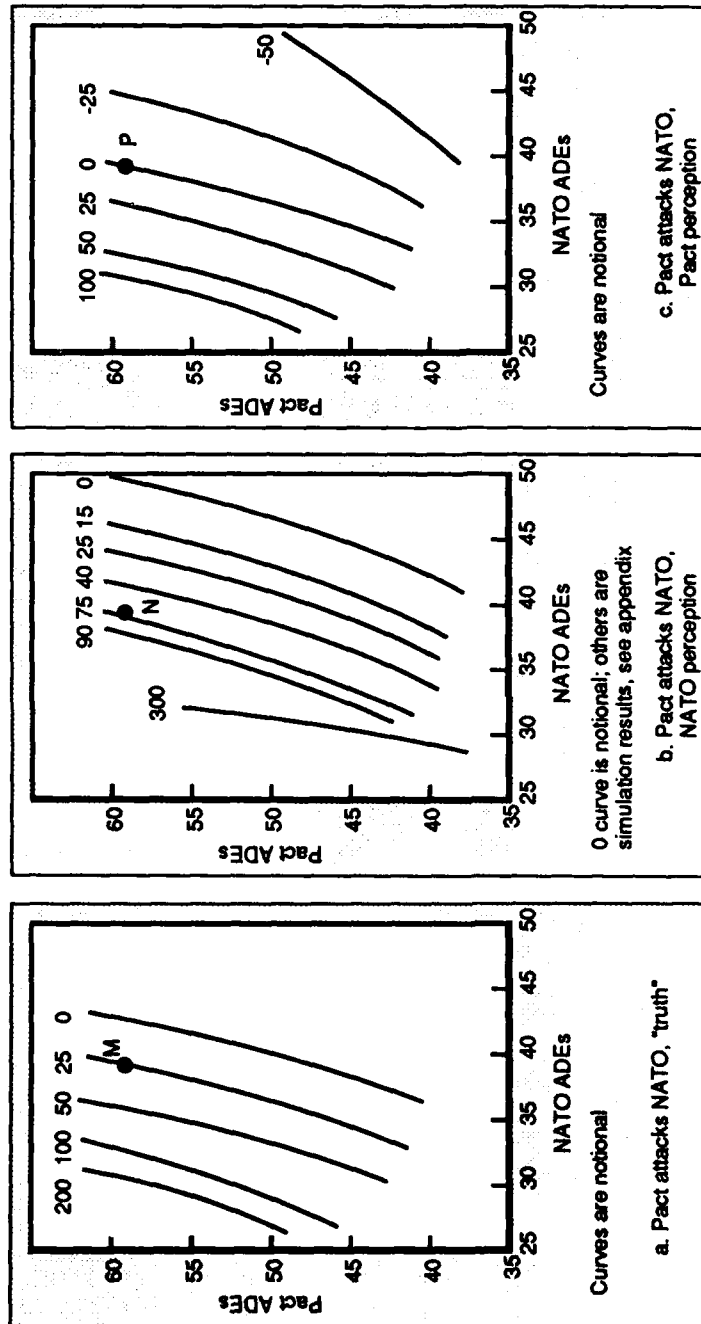


Fig. 10—Pact attacks NATO—shifts due to perceptions

those in Fig. 10a. NATO's somewhat pessimistic outlook causes it to believe that it would need more capability than it really would to cut Pact penetration from 25 km to none.

The discussion above should not be construed to mean that NATO necessarily overestimates the threat, underestimates its own capabilities, or biases its analyses. Defense planning should be conservative, and analyses are likely to be based on that conservatism. What the "true" curves look like is unknowable. NATO's perceptions and analyses of the balance may very well coincide with "truth." The "true" situation is unknown, so assumptions about the differences between the "truth" and perceptions have to be made. Because defense planning usually considers the worst case as well as other cases and is therefore somewhat cautious, some conservatism on NATO's part is assumed.

Similar mechanisms cause the changes in the curves between "truth" and the Pact's perceived outcomes as shown in Fig. 10c. Little information on Pact perceptions is available, and some assumptions have to be made based on the analysis of how the Pact's perceptions might change the curves. These assumptions can be used to generate the hypothetical Pact perception curves in Fig. 10c. There is some evidence that the Pact is somewhat pessimistic about its capabilities relative to NATO's. If that is the case, the Pact perception would be more favorable than the "truth" for NATO at any level of capabilities. This would cause the curves to shift to the left with respect to the "true" curves. Point P in Fig. 10c, like points M and N, is at 39 NATO and 60 Pact ADEs. Although NATO's perception shows a Pact gain of 75 km and "truth" shows a Pact gain of 25 km, the Pact's perception shows no Pact gain of territory. The Pact's pessimism might also cause it to overestimate the effect of adding an extra NATO division, which could move the curves closer together.

The Pact's perception of the situation shows curves indicating NATO penetration into Pact territory. This reflects a possible Pact belief that NATO would counterattack and attempt to take Pact territory.

Figure 11 shows three sets of iso-MOE curves for a scenario where NATO attacks the Pact. Simulations assuming a NATO attack against the Pact are seldom done in the West. The curves for this case are therefore all notional. Like those shown in Fig. 10, the curves for NATO's perception are more pessimistic for NATO than the "truth," and those for the Pact's perception are more pessimistic for the Pact than the "truth." NATO believes that it would do worse at any given level of capability than it really would, so the curves in Fig. 11b are shifted down. The curves for NATO's perception are also closer

together than the "true" curves; NATO might believe that an extra Pact ADE would gain more territory in a counterattack than that ADE would gain in reality. Conversely, the Pact's perception shifts the curves up, as shown in Fig. 11c; the Pact believes NATO would do better at any given level of capability than NATO really would. The curves are also farther apart because the Pact believes that an extra Pact ADE would be less effective than that ADE really would be.

The curves for the NATO and Pact perceptions do not necessarily represent the outcomes of actual wars. Instead, they are meant to represent what the two sides *perceive* would happen if war were to occur. Deterrence is based on perceptions; therefore, the curves reflecting perceptions of the two sides, whether they are similar to or different from the hypothetical curves presented here, are actually more important to the balance and to conventional stability than the "truth" curves.

### Assessing Offensive Stability

Offensive conventional stability exists when neither side believes that it can achieve its objective by attacking the other side. The iso-MOE framework can be used to assess whether offensive stability exists.

Since offensive stability is based on what each side believes would happen if it attacked the other side, two sets of curves are needed. One set should reflect the Pact's perception of the outcomes if it were to attack NATO. The other set should reflect NATO's perception of the outcomes if it were to attack the Pact. Figure 12 shows these sets of curves. These are the same curves shown in Figs. 11b and 10c.

Before the existence of offensive stability can be determined, attack objectives for the two sides must be included in the framework. Conflict scenarios assuming a Pact attack against NATO are common. Because offensive stability assessment using the iso-MOE framework is reciprocal, it is also necessary to posit a scenario where NATO attacks the Pact and an offensive objective for NATO even though NATO's doctrine is purely defensive. Therefore, a NATO objective of penetrating an average of 15 km into Pact territory is assumed for illustrative purposes in the following discussion. This objective is shown in Fig. 12a by the MOE curve in the bottom right corner of the graph. Curves above that represent levels of capability where NATO does not believe it would achieve its objective if it were to attack. Consider points P, Q, and R on Fig. 12a. If NATO were to attack the Pact and the levels of capability were 47 ADEs for NATO and 35 ADEs for the Pact (point P), NATO perceives that it would achieve its objective of penetrating 15 km into Pact territory. However, if NATO were to attack and the



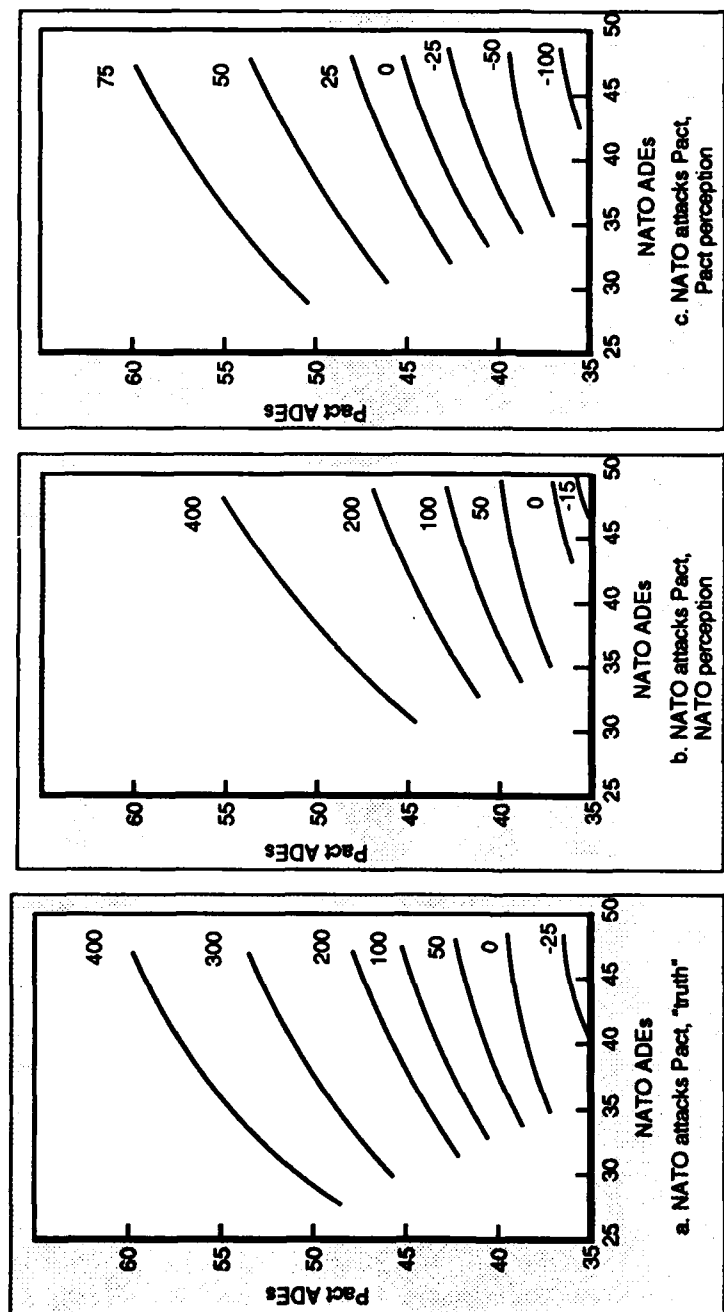


Fig. 11—NATO attacks Pact—shifts due to perceptions  
(Curves are notional)

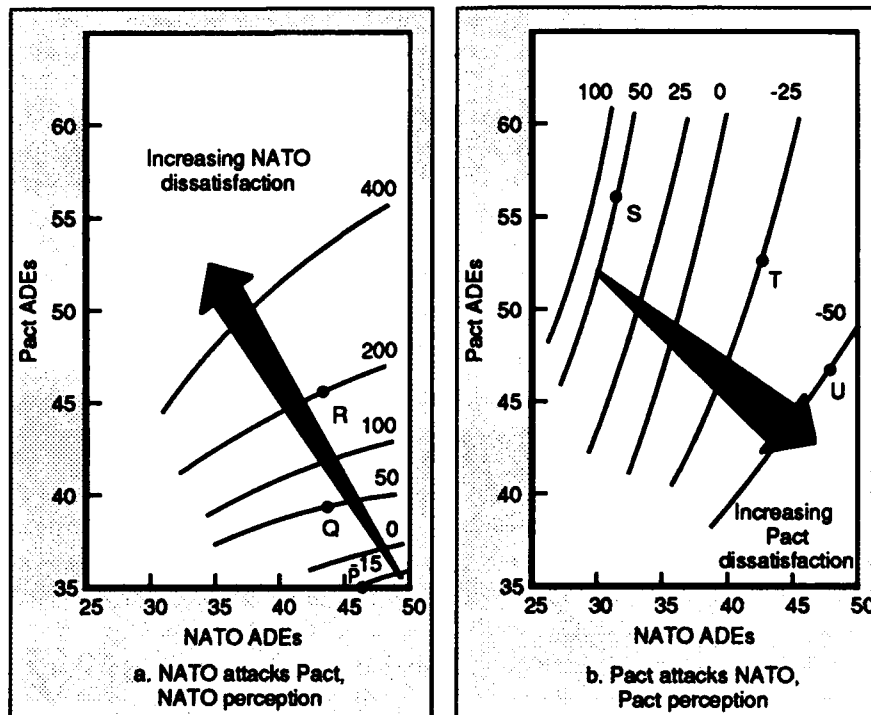


Fig. 12—Assessing offensive stability  
(Curves are notional)

levels of capability were 43 ADEs for NATO and 39 for the Pact (point Q), NATO believes that it would lose an average of 50 km of its own territory to the Pact. The situation at point R would be even worse for NATO. If it were to attack with 43 ADEs facing 45 Pact ADEs, NATO perceives that it would lose an average of 200 km of its own territory. Each curve above NATO's objective curve pushes NATO farther from its objective. The arrow on Fig. 12a represents NATO's increasing dissatisfaction with the outcome of its attack.

Figure 12b shows the Pact perception of what would happen at different levels of military capability if it were to attack NATO. Assume a Pact attack objective of an average penetration of 50 km into NATO territory. At point S, which represents levels of military capability of 32 NATO ADEs and 56 Pact ADEs, the Pact believes that it would achieve its offensive objective. Moving to levels of 42 NATO ADEs and 53 Pact ADEs (point T), the Pact does not believe it would meet

its objective if it attacked. At that point, the Pact perceives that it would lose 25 km of its own territory to a NATO counteroffensive. Moving farther out to point U, at levels of 47 ADEs for each side, the Pact believes NATO would penetrate an average of 50 km into Pact territory. Curves to the right of the Pact's objective curve push the Pact farther from its objective. The arrow on Fig. 12b represents the Pact's increasing dissatisfaction with the outcome of its attack.

Offensive conventional stability is a stability based on mutual dissatisfaction with one's own offensive capabilities. For offensive conventional stability to exist, both sides must perceive that they would not achieve their objectives by attacking. In other words, each side would be dissatisfied with the outcome of the conflict that would occur if it were to attack the other side. In terms of the framework, this would be the overlap of the areas where NATO would be dissatisfied if it attacked and where the Pact would be dissatisfied if it attacked. If these two areas, as shown in Figs. 12a and 12b, are overlapped, Fig. 13 is the result. The area above NATO's objective curve is where NATO would be dissatisfied. The area to the right of the Pact's objective curve is where the Pact would be dissatisfied. The area where both would be dissatisfied is the hatched area in Fig. 13. Assuming that these notional curves represent the way the two sides perceive the balance, offensive conventional stability exists in that hatched area. At all the levels of capability represented by the points in this area, neither side would be satisfied with the outcome if it were to attack, so neither side has an incentive to attack.

Although the area shown in Fig. 13 is offensively stable, it is what is commonly called "arms race unstable." This means that both sides have some incentive to increase their capabilities when the current level of capabilities is within this area. If one side increases its capabilities, the other side might then also decide to respond by building up. The first side sees the second side building up and decides it needs to build more in response. A self-perpetuating increase in military capabilities ensues. This buildup of capabilities is called "arms race ratcheting."

Figure 14 shows the hatched area where neither side believes it can achieve its objective. Assume that point X represents the current levels of capability for NATO and the Pact. If the Pact's objective is, as posited above, to penetrate 50 km into NATO territory, the Pact would not be satisfied with the situation at point X; it would like to reach the area where it could achieve its objective if it decided to attack NATO. The Pact would have an incentive to build up its capabilities, toward point Y, where it could achieve its objective. This illustrates the force creating the arms race ratcheting: the desire by each side to reach the

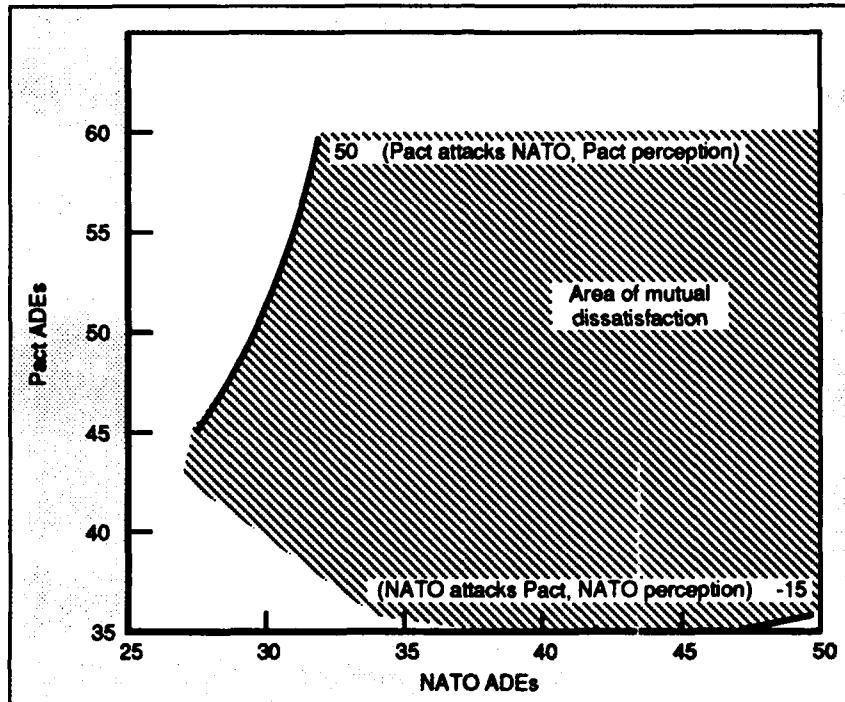


Fig. 13—Area of offensive stability  
(Curves are notional)

area where it can meet its objective. If NATO's objective, as assumed above, is to achieve a 15 km penetration into Pact territory, NATO would also be subject to this force. It wants to increase its capabilities toward the area where it could meet its objective. But as each side builds up, it pushes the level of capability away from the area where its opponent could achieve its objective. So the incentive to build up continues, and an arms race, represented by the arrows in Fig. 14, results.

Although such continued incentive to increase military capabilities is generally considered "arms race unstable" because it has no clear end point, it can actually have a beneficial effect on offensive conventional stability as long as *both* sides continue to race. While neither side believes it can achieve its objective, offensive conventional stability will be maintained. If, however, the Pact builds its forces up and NATO does nothing, the levels of capability could reach point Y in Fig. 14. At

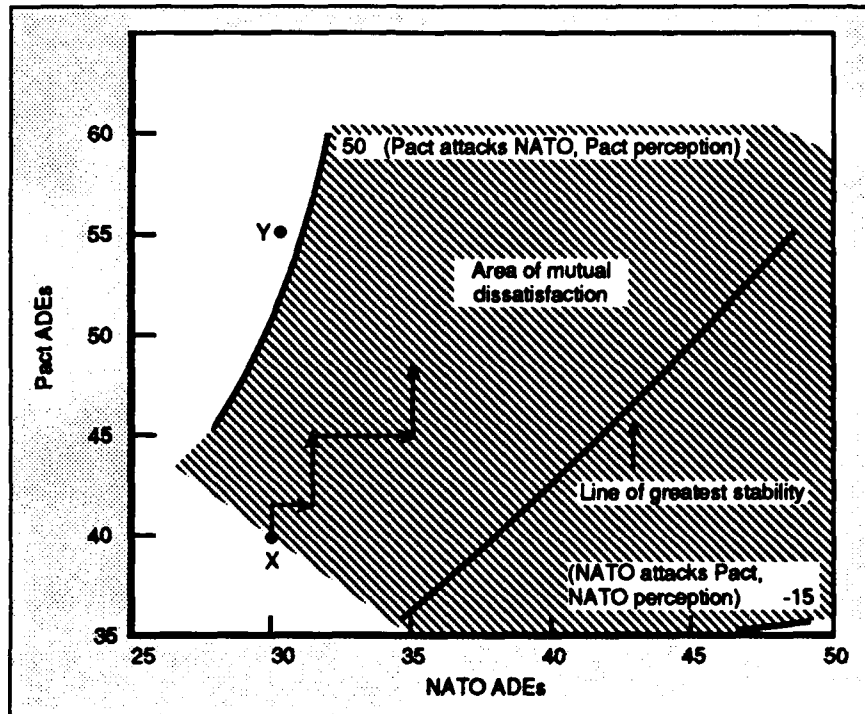


Fig. 14—Arms race ratcheting  
(Curves are notional)

this point, the Pact perceives that it could achieve its objective, and it might have an incentive to attack. Similarly, if NATO increases its capabilities without a corresponding Pact response, NATO could reach a point where it believes it could achieve its objective. NATO might then have an incentive to attack. These situations would no longer be offensively stable.

Not all points within the region of offensive stability are equally stable. Points equally distant from both edges of the region (shown by the line in Fig. 14) are more stable than other points. If the perceptions or objectives of either side were to change, the curves bounding the stable region would change, and the size of the stable region could decrease. A crisis, for example, might make one side less conservative in its estimation of its capabilities or those of its adversary. Because the magnitude and direction of the change would be uncertain, the

points along the center line are more likely to remain in the stable region than other points. This implies that the most stable points must be both along the center line and far from the two edges. Assuming that these notional curves are the right shape, the most stable points are the ones along that center line at high levels of capability farther from the edges of the stable region.

One can conclude from this that larger conventional forces are more likely to create a more offensively stable situation than smaller forces. This result makes sense from an operational standpoint. Although more forces would be available to attack, the defender would have a large number of forces with which to thwart the attack. The large numbers of forces on each side are likely to keep both sides from attacking successfully. If there were few forces on each side, the situation would not be as stable. The defending forces would be spread very thin, perhaps too thin to defend cohesively.<sup>9</sup> The attacker could concentrate his forces and break through the thin defensive line, and he could potentially gain quite a bit of territory. If there were even fewer forces, the defense would become even more spread out. Holes could develop in the defensive line, and the attacking forces could exploit them. Such a situation is less likely to occur if there are more defending forces. Denser defending forces would have a better chance to defend cohesively, even against many attacking forces. If both sides have large forces, each side is less likely to achieve its offensive objective than if both sides have few forces. A situation where both sides have large forces is more likely to be offensively stable.

### Assessing Defensive Stability

Defensive conventional stability exists when each side believes that it can achieve its defense objective if it is attacked by the other side. The iso-MOE framework can be used to assess whether defensive stability exists. Because defensive stability is based on what each side believes would happen if it were attacked by the other side, two sets of curves are again needed. One set should reflect the Pact's perception of the outcomes if it were attacked by NATO. The other set should reflect NATO's perception of the outcomes if it were attacked by the Pact. Figure 15 shows these sets of curves.

<sup>9</sup>A frequently used rule of thumb calls for a minimum of one armored division equivalent to defend 25 km along the IGB. Assuming a 650-750 km frontier, NATO would need a minimum of 26-30 ADEs plus operational reserves to defend. The roughly 34 ADEs that are in Central Europe in peacetime would barely fulfill that requirement. Even the 46-60 divisions that would be available after a few weeks of mobilization would be enough only to provide NATO with a defensive line and a small reserve (Kugler, 1986, p. 23).

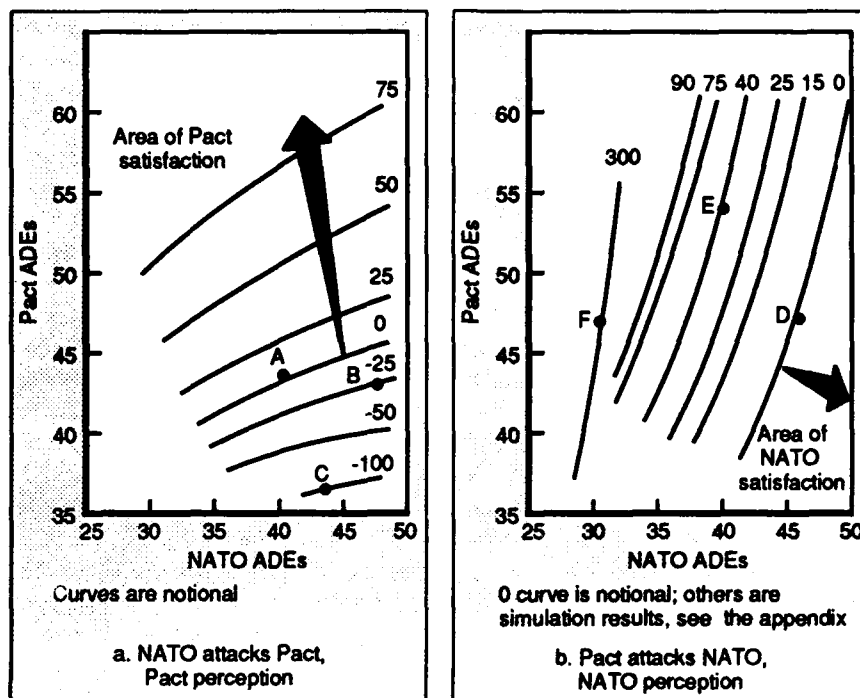


Fig. 15—Assessing defensive stability

Before the existence of defensive stability can be determined, defense objectives for the two sides must be included in the framework. Figure 15a shows the Pact perception of what would happen at different levels of military capability if it were attacked by NATO. Again, because little information is available on Pact perceptions, these curves are notional. Assume a Pact defense objective of allowing no NATO penetration into Pact territory. At point A, which represents levels of military capability of 40 NATO ADEs and 43 Pact ADEs, the Pact believes it would achieve its objective. Moving to the right, to levels of 47 NATO ADEs and 43 Pact ADEs (point B), the Pact does not believe it would meet its objective if were attacked. At that point, the Pact perceives that it would lose 25 km of its own territory. Moving to point C, at levels of 43 NATO ADEs and 36 Pact ADEs, the Pact believes NATO would penetrate an average of 100 km into Pact territory. The area above the Pact's defense objective curve, shown by the

arrow on Fig. 15a, is where the Pact believes it would achieve its defense objective and would be satisfied with the outcome if it were attacked by NATO.

In Fig. 15b, a NATO objective of allowing no penetration by the Pact into NATO territory is postulated. This objective is represented by the 0 km MOE curve on the graph. Although the 0 km curve is extrapolated, the other curves are derived from simulation results.<sup>10</sup> Curves to the left of the 0 km curve represent levels of capability where, if NATO were attacked, it does not believe it would be able to hold the Pact off. Points D, E, and F in Fig. 15b represent the results of Pact attacks on NATO at different levels of capability. If the Pact were to attack NATO and the levels of capability were 46 ADEs for NATO and 47 ADEs for the Pact (point D), NATO perceives that it would achieve its defensive objective of allowing no Pact penetration into NATO territory. However, if the Pact were to attack and the levels of capability were 40 ADEs for NATO and 54 ADEs for the Pact (point E), NATO believes that it would lose an average of 40 km of its own territory to the Pact. The situation at point F would be even worse for NATO. If NATO were attacked by the Pact with 31 NATO ADEs facing 47 Pact ADEs, NATO perceives that it would lose an average of 300 km of its own territory. The area to the right of NATO's defense objective curve, shown by the arrow on Fig. 15b, is an area where NATO would achieve its defense objective and would therefore be satisfied with the outcome if it were attacked by the Warsaw Pact.

Defensive conventional stability is a stability based on mutual satisfaction and on denial. For defensive conventional stability to exist, both sides must perceive that they could achieve their defensive objectives if attacked by the other side. In other words, each side would be satisfied with the conflict outcomes that would occur if it were attacked by the other side. In terms of the framework, this would be the overlap of the area where NATO would be satisfied with its defense if it were attacked by the Pact and where the Pact would be satisfied with its defense if it were attacked by NATO. If these two areas, as shown in Figs. 15a and 15b, are overlapped, Fig. 16 is the result. The area to the right of NATO's objective curve is where NATO would be satisfied. The area above the Pact's objective curve is where the Pact would be satisfied. If these curves represent the way that the Pact and NATO perceive their defensive capabilities, then each side believes it could thwart an attack by the other side at all levels of capability within this area. This is the area of defensive stability. Both sides believe they

<sup>10</sup>See the appendix.



could achieve their defense objectives in this area. The area of defensive stability is smaller than the area of offensive stability shown in Fig. 13 and is included in it.

The area of defensive stability is also potentially arms race unstable. Assume that the current levels of capability are at point G in Fig. 16. Both sides believe they can achieve their defensive objectives at this point. There is no incentive to build up connected with defensive objectives. However, since Fig. 13 indicates that this area is also offensively stable, neither side believes that it can achieve its offensive objective. If either side begins to build its forces up to try to get to an area where it could achieve its offensive as well as its defensive objective, the situation could be pushed out of the defensively stable area. If one side builds up, the other side would be likely to increase its capability as well, and an arms race would occur.

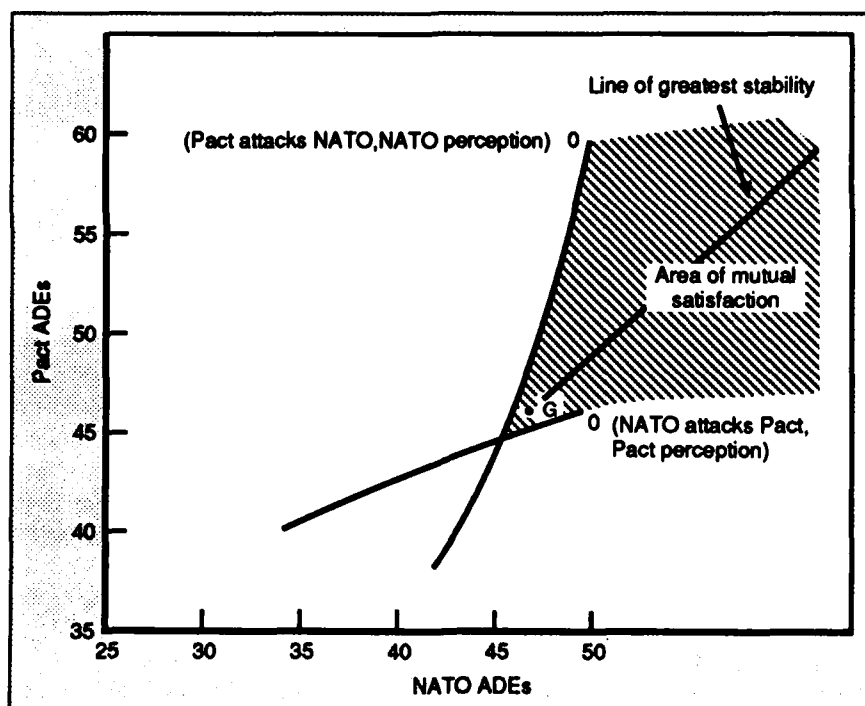


Fig. 16—Area of defensive stability  
(Curves are notional)

Again, not all points within the region of defensive stability are equally stable. Points equally distant from both edges of the region (shown by the line in Fig. 16) are more stable than other points. This situation is similar to the one for offensive stability. If the perceptions of either side were to change, the curves bounding the stable region would change. The size of the defensively stable region could decrease. Because the magnitude and direction of the change would be uncertain, the points along the center line are more likely than other points to remain in the stable region. This implies that the most stable points must be not only along the center line but also farthest from the two edges. Assuming that these notional curves are the right shape, the most stable points are the ones along that center line at high levels of capability.

As with offensive stability, this leads to the conclusion that larger forces are more likely to create a more defensively stable situation than smaller forces. This conclusion again makes sense from an operational standpoint. The more forces a side has to defend with, the denser those forces will be along the front. A defensive force that is tightly packed all along the front would be more likely to be able to defend cohesively against an attack. A more thinly spaced defense would be less able to defend cohesively, even against a fairly small attacking force. Because the attacker has the choice of time, place, and force concentration, a thinly spaced force could be vulnerable to concentrated breakthrough efforts. A denser defending force would be better able to withstand such an attack even against a larger attacking force.

## **THE ROLE OF ARMS CONTROL IN ENHANCING CONVENTIONAL STABILITY**

### **Limiting Total Capability**

Arms control can help to increase conventional stability in two important ways. The first is by limiting the total amount of capability the two sides can have. This could be done by limiting the number of forces deployed (e.g., a cap on the number of divisions or tanks), the types of forces deployed (e.g., a ban on tanks), the qualitative improvement of forces (e.g., controlling modernization), or the resources used (e.g., military budget ceilings). Such limitations could help curb the arms race ratcheting effect noted above by imposing a maximum level of capability for the two sides' forces.

Limitations on total capability could enhance offensive conventional stability. If the current level of capability is not within the area of

offensive stability (for example, point J on Fig. 17), reductions or limitations could be negotiated that would move the current state into that area. If the current level is already inside the offensively stable area (point K), negotiations should ensure that reductions do not create a new level of capabilities outside the stable area (point L). Care must be exercised in negotiating agreements to ensure that reductions do not create a less stable situation. Not all arms control agreements will necessarily improve stability.<sup>11</sup> For example, if these curves accurately represent the perceptions of the two sides and if the current state is represented by point K in Fig. 17, an agreement in which both sides reduce to point L would decrease stability. Point L is outside the area of offensive stability and is in the area where the Pact believes it would achieve its objective by attacking NATO. This is clearly not a good spot for NATO to be in. Reducing capabilities to point M, although better than point L, would also not be the best solution. As noted above, not all points inside the stable area are equally stable. Although M is within the offensively stable area, it is very close to the edge. A small and perhaps undetectable buildup by the Pact could push the current state out of the stable area. A change in the Pact's objective or in its perception of its ability to meet its offensive objective could change the curves and therefore the stable area. Point M might no longer be inside the stable area.

This is not meant to imply that stability is a knife-edge phenomenon; one or two divisions do not usually make the difference between a stable and an unstable situation in the real world. However, the closer one gets to the edge of the stable area, the less certain the Pact gets that it would not achieve its objective. In other words, the Pact (or NATO, at the other edge of the area) might change its objective or might decide that its uncertainty about its ability to achieve its attack objective is large enough that it might just be able to achieve the objective; it might decide to attack after all. The farther the current state is from the edge of the stable area, the less likely this situation is to occur. A point at the center of the region is also less likely to become unstable as a result of changes in perceptions. So a state like point N, closer to the center of the stable region and in a fairly wide part of the region, is preferable to point M.

Limitations on overall military capability could also enhance defensive conventional stability. Assume that the current level of capabilities is at point P in Fig. 18. That point is not within the area of

<sup>11</sup>This point is supported by Thomson and Gantz, 1987. They show that equal NATO and Pact reductions in capabilities will make NATO worse off. Even reductions at a Pact:NATO ratio as high as 3:1 could push NATO farther from its forward defense objective.

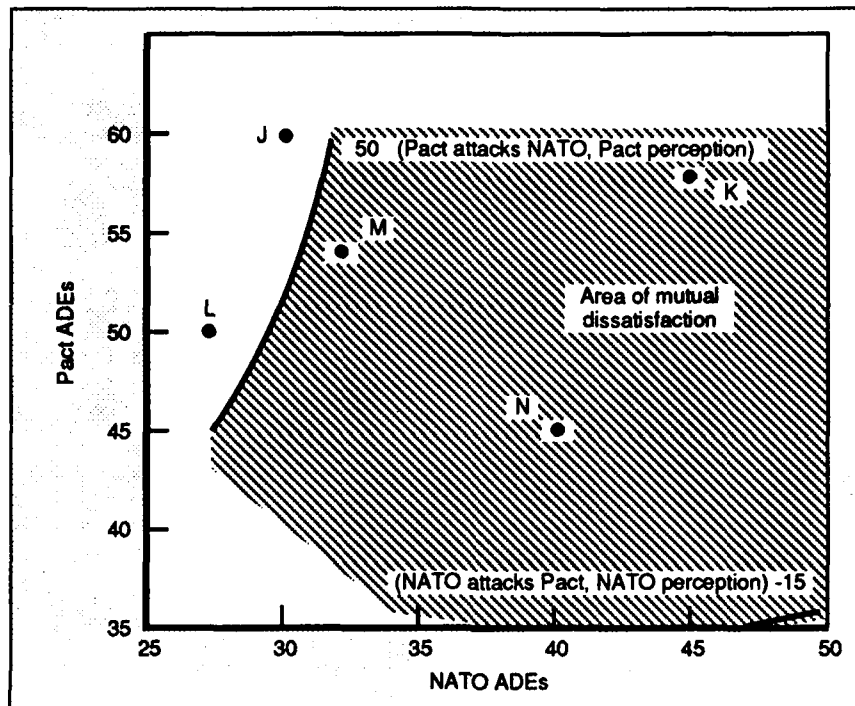


Fig. 17—Enhancing offensive stability with force limitations  
(Curves are notional)

defensive stability, which is represented by the hatched area. Arms control reductions could move the current state down to point Q, which is within the stable area. At point Q, NATO and the Pact both believe they could defend against an attack by the other side. Point R would be even better than point Q because R is in the center of a wider part of the stable region. However, moving to point R would require reductions by the Pact and an increase in capabilities by NATO.

#### Decreasing Offensive Potential

A second possible contribution that arms control might make toward improved conventional stability involves changing the character of military forces. A great deal of interest has recently been expressed in various approaches to reducing the offensive potential of these forces

engage in offensive operations would make it more difficult for the attacking side to take territory. An attack at any given level of capability would penetrate less than under the current force structure. Consider the case where the Pact attacks NATO. Figure 19a shows the MOE curves generated earlier in this section for the "true" case without any changes to the force structure. Figure 19b shows how those curves might change if the offensive capabilities of both sides were substantially reduced. What the new curves would really look like is uncertain; however, notional curves can be drawn using some reasonable assumptions about how the situation changes under the new force structure. There are two probable changes. First, the curves would become more vertical in the case with less offensive capability because one extra division added to the defense could more easily hold off many more opposing divisions, which would have less offensive potential. Second, because the forces would have less offensive capability, the attacker would have to add relatively more divisions to take the same amount of territory. Therefore, the curves both shift to the left and spread out.

Figure 20 shows the curves for a postulated case where NATO attacks the Pact. Again, what the curves would really look like is uncertain, but some reasonable assumptions can be made. The same effects would probably change these curves. Figure 20b shows notional curves for the case where both sides have less offensive potential. While the Pact is defending, the curves are nearly horizontal (e.g., the 0 km curve). More capability is required for NATO to take any territory. But when the Pact counterattacks and tries to take territory, it becomes the attacker and the curves become more vertical (e.g., the 20 and 40 km curves) since it is easier for NATO to defend than it is for the Pact to attack. It is harder for the Pact to take territory with less offensive capability, so the curves spread out.

**Changes Due to Perceptions.** Perceptions will change the curves even in a world with less offensive potential. Figure 21 shows how the curves might change for the case where the Pact attacks NATO. Figure 21a is the "true" set of curves discussed above. Exactly how the curves would change as perceptions are introduced is uncertain; however, likely changes can be assumed, and new curves can be generated using those assumptions. The same basic principles would probably work to change these curves as changed the ones under the more offensive force structure. Both NATO and the Pact would probably be somewhat pessimistic about their own capabilities relative to those of their adversary. From NATO's point of view, more capability would be needed to hold the Pact to no territorial gain. This would shift the curves to the right as shown in Fig. 21b. The Pact would overestimate

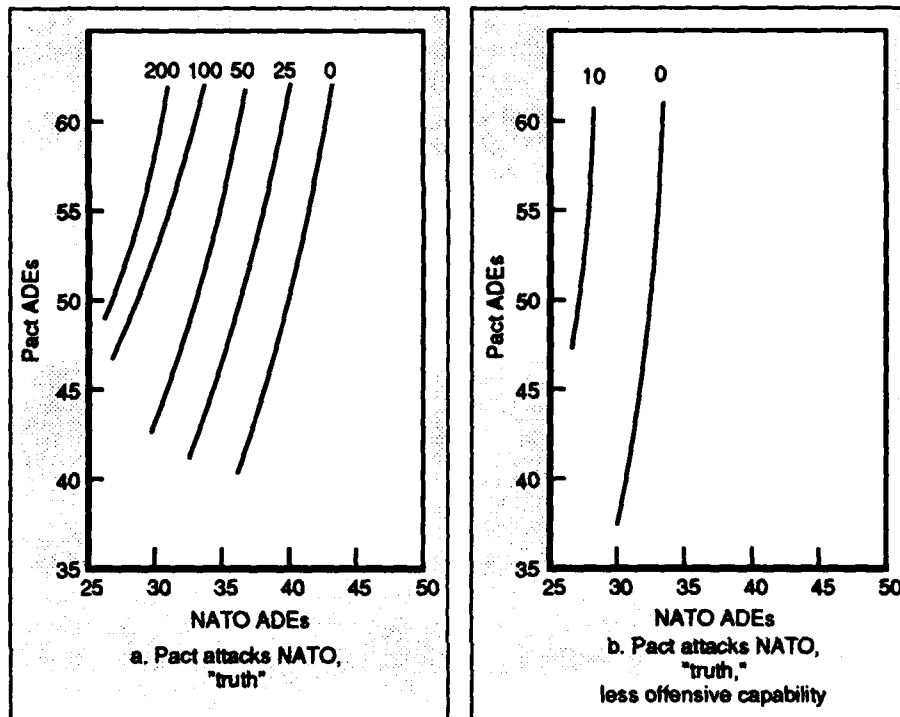


Fig. 19—Effects of decreasing offensive capability—  
Pact attacks NATO  
(Curves are notional)

NATO's ability to defend, which would shift the curves to the left. This is shown in Fig. 21c. The Pact again believes NATO might try to counterattack, so curves showing possible NATO penetration into Pact territory are introduced. Figure 22 shows the likely changes in the curves due to perceptions for the case where NATO attacks the Pact.

**Conventional Stability with Less Offensive Potential.** Although reducing overall capabilities alters stability primarily by changing the position of the current state relative to the existing stable areas, decreasing the offensive potential of the force structures actually changes the positions of the objective curves and thus changes the areas of stability. Not surprisingly, if the curves change as postulated in reaction to the changes in force structure, the region of offensive conventional stability could be greatly expanded. Recall that offensive objectives of gaining an average of 50 km of NATO territory and gaining 15 km of Pact territory were assumed above for the Pact and

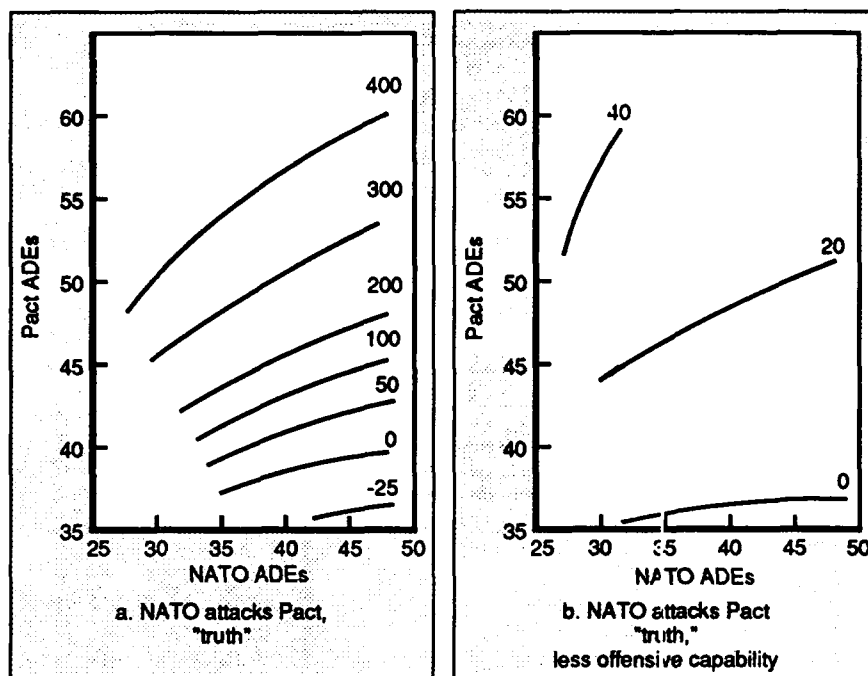


Fig. 20—Effects of decreasing offensive capability—  
NATO attacks Pact  
(Curves are notional)

NATO, respectively. In Fig. 21c, the Pact believes it would be unable to achieve its offensive objective of gaining 50 km of NATO territory within the range of capabilities shown on the graph. Similarly, Fig. 22b shows that NATO believes it would be unable to achieve its offensive objective within that range of capabilities. In this case, the area of mutual dissatisfaction increases to cover the entire graph (and then some). Figure 23 shows the increased area of offensive conventional stability.

The area of defensive stability would also increase if the offensive potential of forces could be reduced relative to their defensive capabilities. Again assume that each side's defense objective is to allow no territorial penetration by the attacker and that the notional curves accurately reflect the perceptions of both sides. According to Fig. 21b, NATO believes it would achieve that objective in the area to the right of its 0 km curve. The Pact believes it would achieve its objective in the area above its 0 km curve in Fig. 22c. Where these two areas

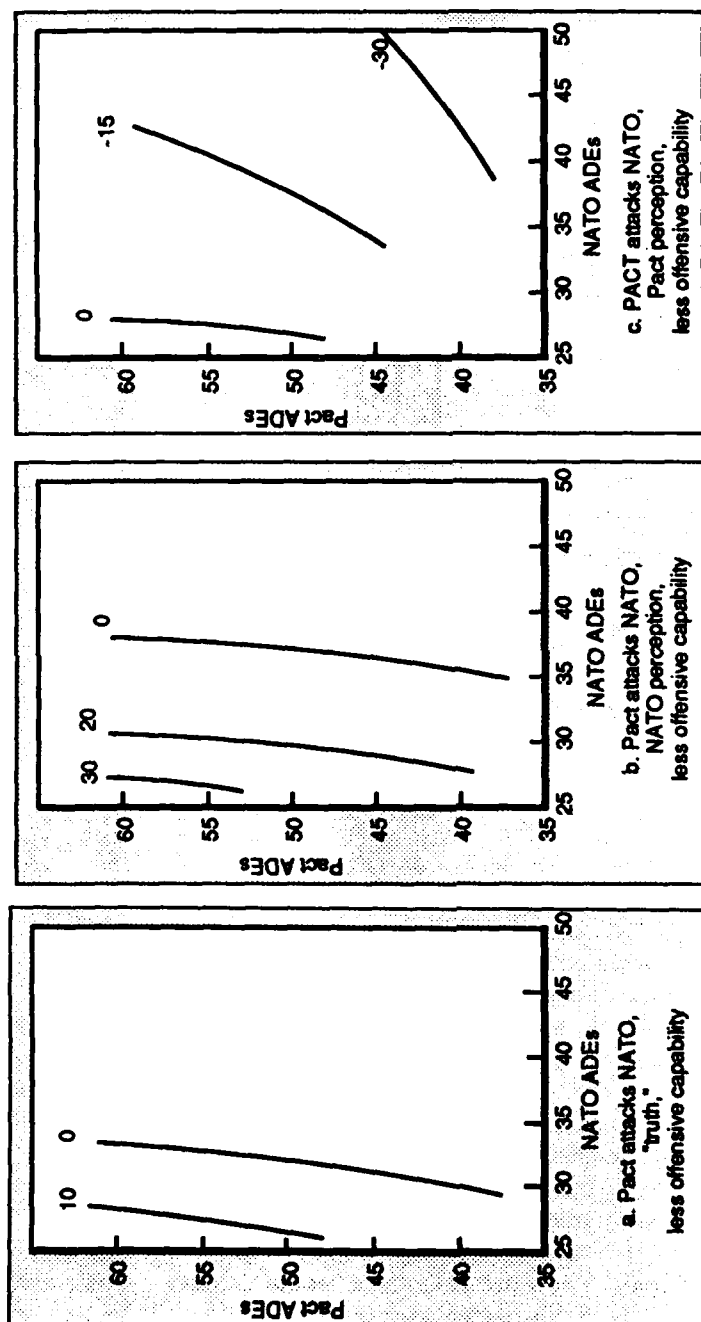


Fig. 21—Pact attacks NATO, less offensive capability—  
 shifts due to perceptions (Curves are notional)



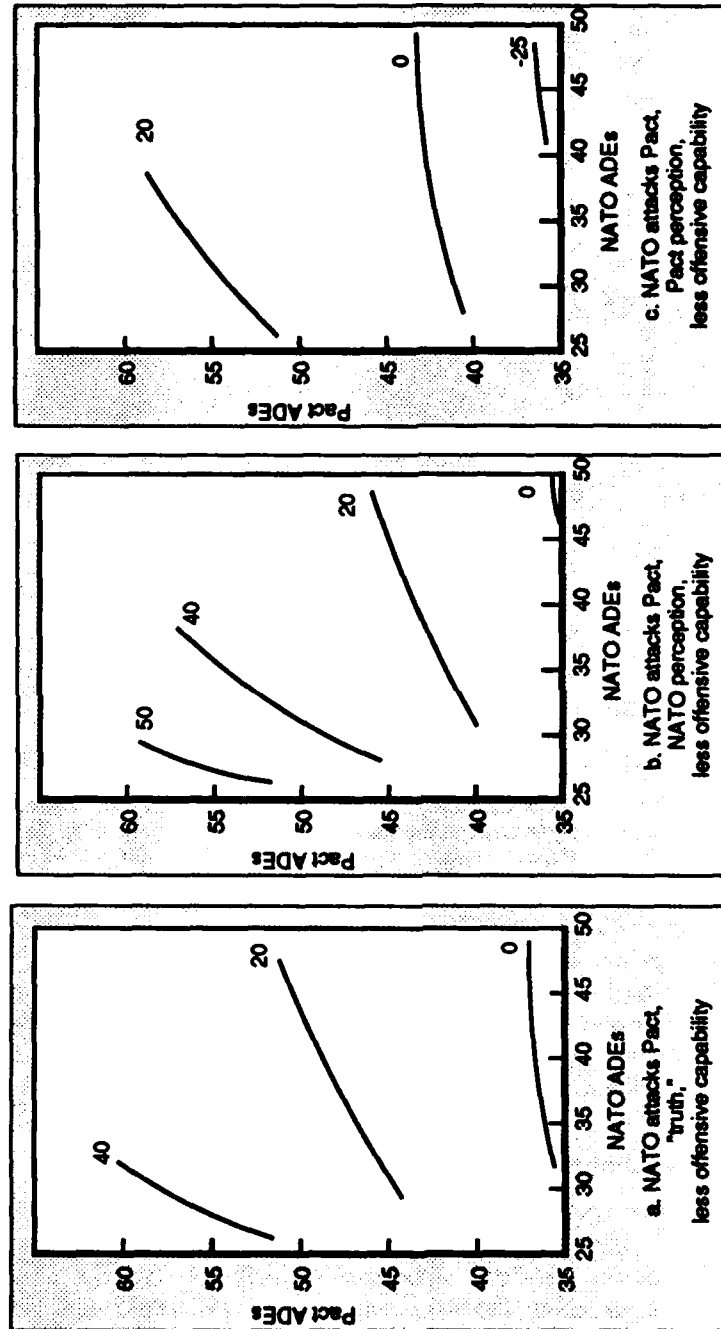


Fig. 22—NATO attacks Pact, less offensive capability—shifts due to perceptions (Curves are notional)

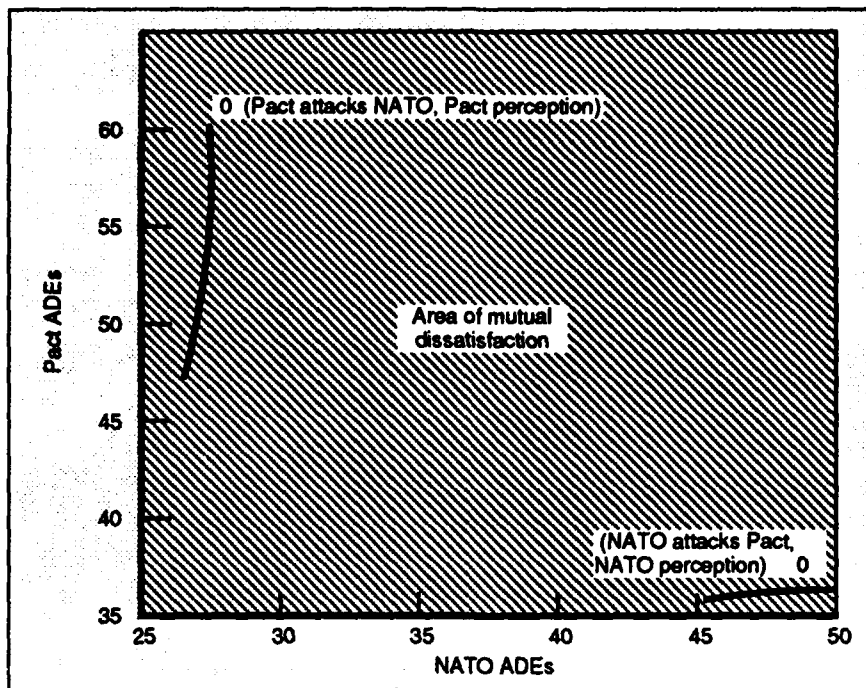


Fig. 23—Area of offensive stability, less  
offensive capability  
(Curves are notional)

overlap is the area of mutual satisfaction and is shown in Fig. 24. At any point within that area, each side is confident that it could achieve its defense objective if attacked by the other side. That is the area of defensive conventional stability. A comparison of Figs. 24 and 16 shows that the posited decrease in the offensive capabilities of both sides has increased the area of defensive stability. Both sides' perceptions have changed. Each feels more confident about its ability to defend, so the area where both sides believe they can achieve their defense objective has grown.

#### Offensive vs. Defensive Conventional Stability

Both offensive and defensive stability are required for conventional stability. As suggested earlier, defensive stability is a more secure stability than offensive stability. If both sides have maintenance of territorial integrity as their defensive objective, they would feel secure about achieving this under conditions of defensive stability. However,

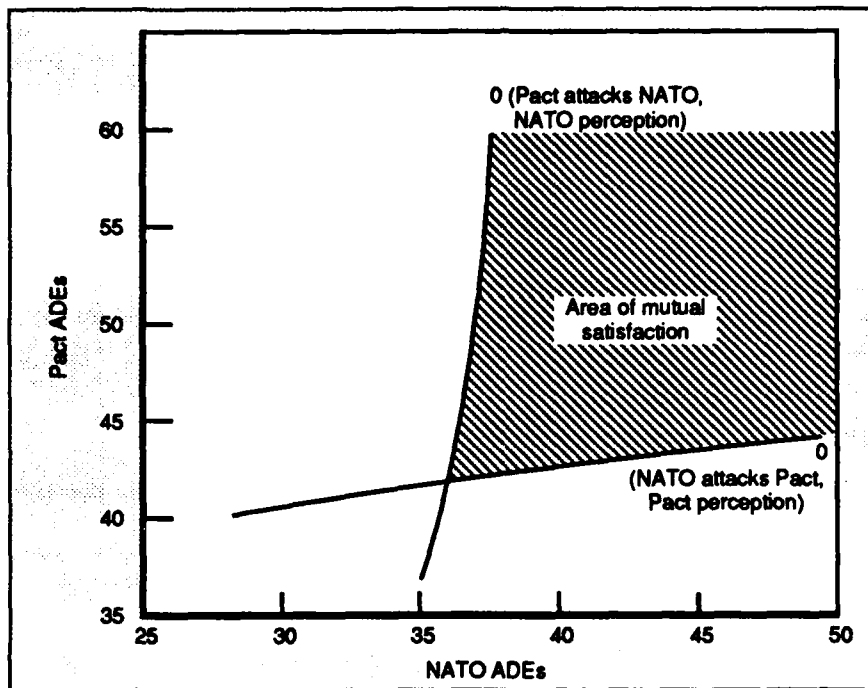


Fig. 24—Area of defensive stability, less  
offensive capability  
(Curves are notional)

there might be fear of losing some territory even if offensive stability exists. Neither side believes it would be able to achieve its offensive objective, but some territory could possibly be taken.

A situation could easily be offensively stable without being defensively stable. A good case can be made that that is the status of the current NATO-Pact balance. If one believes the perceptions of the balance discussed in the two previous sections, neither side seems confident of its ability to defend itself against any enemy attack, but neither side seems to believe it could "successfully" attack the other (that is, achieve its offensive objectives). It is likely, but not certain, that any defensively stable situation would also be offensively stable. If each side believes that it can achieve its defensive objective, each side would probably also believe that it could not attack and achieve its offensive objective. In that case, the existence of defensive stability seems to cause offensive stability to exist as well. However, one can conceive of a situation where this would not be true. Consider a case

where two sides have roughly equivalent forces in terms of capabilities and could realistically defend but could not successfully attack. Assume that one side is realistic (that is, neither optimistic nor pessimistic) about its capabilities and that the other side is overly optimistic about its capabilities. The realist correctly believes that his forces could defend against his adversary but could not successfully attack. The optimist believes that his forces could successfully defend or attack. Defensive stability exists, but because one side believes it could attack successfully, offensive stability does not exist. This scenario is possible, though perhaps unlikely. It seems more probable, but again not certain, that any defensively stable situation is also offensively stable.

### **ADAPTING THE FRAMEWORK**

The iso-MOE framework, like any other analytical tool, is not the final solution to stability analysis. It is, however, a very useful and flexible tool. The application shown involves the central European area; however, the framework can be used to analyze the balance of conventional forces in any region.

Measures of military capability other than armored division equivalents can be used as inputs to the framework. Heavy division equivalents (HDEs), firepower scores, or other measures of combined combat potential can be used. Counts such as number of tanks or aircraft can be used on the graphical framework for display purposes but should not be used as the sole input to an assessment methodology because, as argued above, they do not sufficiently reflect overall military capability. Although division equivalent measures are not the only option, some type of combined arms measure is best.

The measures of effectiveness used in the framework can be easily changed. Most combat simulations produce a range of outputs, any one of which can be used. Presumably, one would choose MOEs that could assess progress toward one's objectives. If a side's objective is to allow the other side no territorial gain, for example, the average penetration by the enemy would be an appropriate MOE. One might want to use the maximum enemy penetration in addition to the average penetration. Use of this MOE would show whether one area of the front is substantially weaker than others. Although the average penetration might not be high, there might be one area where the enemy penetrated very far. This fact could be relevant to the objective but could be lost if only average penetration is assessed. If objectives change, or if multiple objectives are chosen, other MOEs could be

chosen that more closely reflect the new or added objectives. If, for example, the defense wants to hold a particularly strategic area for as long as possible, a reasonable MOE would be the number of days until the enemy reached that area.

The framework can reflect the effects of many different kinds of force structure changes. Progress toward defense objectives and changes in conventional stability due to force buildups or reductions can be assessed, as can the effects of proposed arms control agreements and of force modernization.

Different conflict scenarios and measures of effectiveness can be chosen for doing sensitivity analyses. The framework can be easily used for this purpose.<sup>13</sup> Doing sensitivity analyses using different scenarios and MOEs is crucial. Improvement in one MOE could cause degradation in another. For example, consider the MOEs of force ratio and average enemy penetration at the end of a conflict. It might well be possible to improve the force ratio from 1:1 to 1.5:1; however, an improved force ratio will not make much difference if the enemy is allowed to penetrate much farther to achieve that improvement. Sensitivity analyses would help show whether force structures resulting from an arms control treaty would move a side closer to one objective at the expense of moving farther from others.

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<sup>13</sup>This assumes that the assessment methodology chosen can be easily used for this purpose as well. If it is very difficult to change input force structures or parameters or to get different outputs with the chosen assessment technique, an alternative technique might be preferable.

## V. CONCLUSIONS

### BALANCE ASSESSMENT METHODOLOGIES

Static methodologies can be useful tools but are insufficient for getting a complete picture of the conventional balance in Europe; however, static equipment counts are the language of arms control. Treaties involving force limitations codify those limitations in numbers of weapons. Although assessments should not be done strictly in terms of numbers, desired levels of capabilities must eventually be translated into weapon, unit, or manpower counts.

Buildup rate methodologies are useful, particularly for assessing how different lengths of time available for mobilization change force ratios at the beginning of a conflict, and for considering when forces become available. Their primary weakness is that they fail to capture how the situation changes once conflict begins.

Dynamic computer-based combat simulations are probably the most useful of the techniques. They can capture more of the complexity of combat processes than other techniques, and their input assumptions can usually be changed to perform sensitivity analyses. Simulations do have problems. They are very complex, so it can be difficult to determine exactly why events in the conflict occur as they do. Simulations often cannot capture the uncertainties involved in war because such uncertainties are often random phenomena. As long as their limitations are recognized, simulations can provide important insights.

It is certainly unwise to take one result of any assessment technique as "the answer" to the question of the conventional balance. A better approach is to find a reasonable base case result (for example, the outcome of a war using current capabilities), redo the assessment many times using many different assumptions, and examine the trends that emerge. If the analysis and the methodology are structured well, such sensitivity analyses should not be difficult to do.

For the purpose of judging progress toward conventional stability, dynamic computer simulations are the most useful. Although current models are far-from-perfect analytical tools, they can provide valuable insights. They relate input military capabilities to combat outcomes and are better able to capture the effects of a range of combat phenomena. With simulation outputs, it is possible to assess progress toward defense objectives, and so toward conventional stability.

## THE ISO-MOE FRAMEWORK

The iso-MOE framework for assessing the conventional balance and conventional stability provides a link among defense objectives, force planning, and arms control policy. It permits one to assess the effects on conventional stability of changes in force structure, objectives, and perceptions. It also enables the analyst to tie together balance assessments done using different methodologies, a range of measures of military capability, an explicitly defined concept of conventional stability, and defense objectives. The effects of force improvements on stability and on progress toward objectives can be assessed. If defense objectives are not being met, the framework can provide some idea of what needs to be done to meet them.

The effects of conventional arms control proposals on stability and objectives can also be elucidated. Proposals can be analyzed before being promulgated or accepted, so agreements that would have adverse effects on stability or would push a side farther from its defense objectives can be eschewed. Concrete military objectives for arms control negotiations can be generated as a result of such analysis.

The ability to analyze the effects of force improvements and arms control policy on defense objectives provides a needed link between these three important aspects of defense planning. Defense objectives should always be considered in the force planning process, and arms control agreements should be analyzed in terms of their effect on those objectives.

The part of the framework that incorporates Pact perceptions and quantitative assessments of the conventional balance currently must be based on speculation. There is very little on these subjects in the open translated literature. However, the flexibility of the iso-MOE framework allows assumptions to be changed. One can make different assumptions about how the Pact assesses and perceives the balance and do sensitivity analyses to check the robustness of a proposal's effects on stability under these varying assumptions. Warsaw Pact balance assessment methodologies merit serious additional research.

An obvious and important area for future work is ways to improve computer simulations. How to model the effects of maneuver warfare and other combat phenomena more accurately, and how to better reflect the differences due to major qualitative changes in force structures and postures are two critical questions.

Another possibility for future work involves the quantification of degrees of stability. The methodology presented here suggests that levels of military capabilities can be considered stable or unstable and that some stable points might be "more stable" than others. Future

work might attempt to quantify these differences more precisely. It might be possible, for example, to construct a contour map something like the one in Fig. 25, showing areas of "iso-stability."

The framework presented here does not consider everything that affects the conventional balance; such an ideal tool does not exist, and probably never will. Like all tools, this framework has its limitations. Many factors affect the conventional balance and stability, but no quantitative methodology is ever likely to model them sufficiently. Political objectives, popular concerns, and alliance politics are some of the more important factors. These are uniquely human considerations and cannot currently be completely quantified or simulated in a computer model. Nevertheless, they affect the balance and should be considered when doing comprehensive assessments.

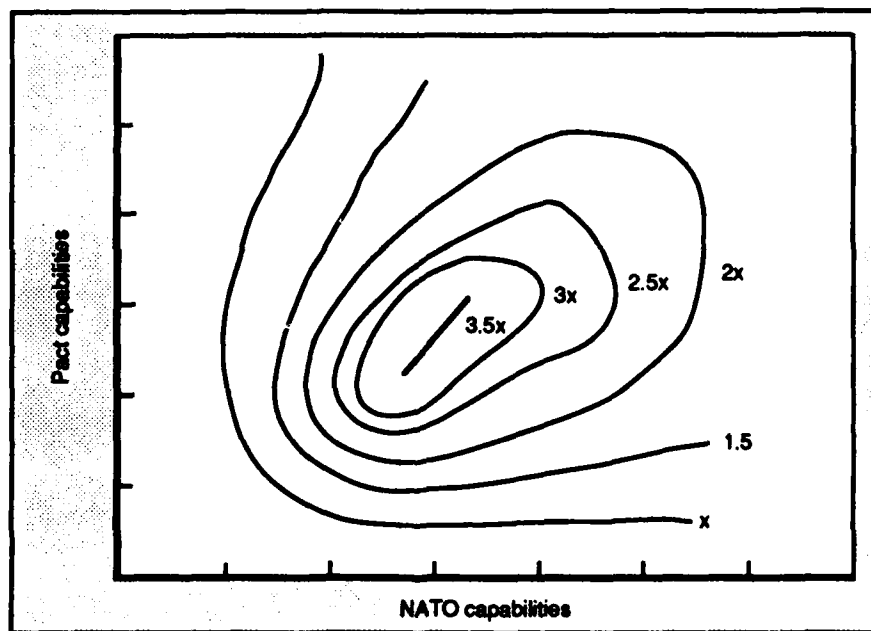


Fig. 25—Levels of iso-stability  
(Curves are notional)



## THE ROLE OF ARMS CONTROL IN STABILITY ENHANCEMENT

Arms control can increase conventional stability in two key ways. First, it can limit the total amount of capability the two sides can have. The iso-MOE framework can be used to determine how arms control limitations or reductions would affect offensive conventional stability. The framework can assess whether NATO or the Pact might believe it could attack the other side and achieve its objective at the new levels of capability. If so, the proposed agreement could be rejected as detrimental to offensive conventional stability. A new agreement could be proposed that would increase or maintain offensive stability by ensuring that neither side would be certain of its ability to attack the other and achieve its objective. The framework can also help to ensure that any proposed agreement would create a situation that is well within the areas of offensive and defensive stability. Getting too far away from the center of those stable regions increases uncertainty; one side might be tempted to attack if uncertainties were large enough to make it believe it could achieve its objectives, or its objectives might change. Getting away from the center of the region can also undermine defensive stability if one side starts to believe that its defenses might not hold against an attack. Assessment using the iso-MOE framework can help prevent these situations.

The second way arms control might be able to increase conventional stability is by decreasing the offensive potential of the two sides' forces relative to their defensive capabilities. Should such an approach prove practicable, the iso-MOE framework could be used to assess how the regions of offensive and defensive stability change with the character of the forces. As offensive capability is removed from the forces, both areas of stability should increase. The extent of those increases and their effect on the position of the current levels of capability can be assessed within the framework.

If the analysis presented here is correct, arms control agreements that decrease the offensive potential of both NATO and Pact forces while preserving defensive capabilities would be more likely to increase conventional stability than simple reduction agreements. Given current force structures, it might be very difficult to reach an area of defensive stability. If the curves in Fig. 16 are close to correct, reaching that area would require a unilateral decrease in capabilities by the Pact and a buildup of NATO capabilities. An arms control agreement yielding these conditions is unlikely to be accepted by both sides. A more productive course would be first to conclude an agreement that would decrease the offensive capabilities of both sides' forces without

hurting those forces' ability to defend. The nature of such an agreement is unclear; however, measures that might fit this criterion should be investigated.

The implementation of an agreement that reduced offensive potential relative to defensive capabilities could increase the size of both the offensive and defensive areas of conventional stability. The framework presented here could potentially be useful in analyzing the effects on stability of such an agreement. It might then be possible to find a level of capabilities that would be acceptable to both sides and conventionally stable. At that point, a limitation agreement could be generated that would maintain that stability, would curb at least quantitative arms race pressures, and would help to ensure that the two sides remained well within the areas of stability. However, mutually decreasing force levels without first decreasing their offensive potential could make the situation considerably less stable.

#### OTHER POSSIBILITIES FOR INCREASING STABILITY

Arms control is not the only option for increasing stability. High-level Pact sources have suggested talks on doctrine to ensure that the doctrines of both sides are strictly defensive. Such talks would probably not hurt stability. However, the focus of stability enhancement should be on capabilities rather than on intentions and doctrine; the latter can change without warning but the former cannot. Whether talks on doctrine would change perceptions is questionable.

The concepts of sufficiency, defensive dominance, and nonoffensive defense also offer possibilities for enhancing stability. The absolutes called for by sufficiency and nonoffensive defense are probably not achievable, certainly not in the near term. Sufficiency, or at least what the two sides perceive as sufficiency, is linked to the threat. A defensive posture without any offensive capabilities is not a realistic possibility. The concept of defensive dominance offers the most realistic possibilities for achieving conventional stability; however, it is not at all clear that much offensive capability can be removed from forces while defensive capability is maintained. Nevertheless, all three concepts offer possibilities for stability enhancement. The feasibility of these ideas and the effects of their implementation on stability should be carefully studied in the future, using the iso-MOE framework to the extent possible to assess the potential outcomes of adopting any one of them.

## Appendix

### SIMULATION RUN RESULTS

NATO Change (EDs)	Pact Change (EDs)	Conflict Outcome (kms)	NATO Change (EDs)	Pact Change (EDs)	Conflict Outcome (kms)
0	0	95	0	-20	30
+1	0	90	0	-21	25
+2	0	75	0	-22	20
+3	0	60	0	-23	18
+4	0	40	0	-24	15
+5	0	32	0	-25	12
+6	0	28	-1	-1	95
+7	0	25	-2	-2	100
+8	0	20	-3	-3	160
+9	0	15	-4	-4	230
+10	0	10	-5	-5	300
0	-1	95	-1	-3	95
0	-2	94	-2	-6	95
0	-3	93	-3	-9	98
0	-4	92	-4	-12	110
0	-5	90	-5	-15	140
0	-6	89	-6	-18	180
0	-7	87	-7	-21	230
0	-8	85	-8	-24	295
0	-9	80	-1	-4	95
0	-10	72	-2	-8	90
0	-11	68	-3	-12	85
0	-12	65	-4	-16	80
0	-13	60	-5	-20	75
0	-14	52	-6	-24	65
0	-15	48	-1	-5	92
0	-16	42	-2	-10	83
0	-17	40	-3	-15	75
0	-18	38	-4	-20	60
0	-19	35	-5	-25	40
			-1	-8	85
			-2	-16	75
			-3	-24	50

SOURCE: Thomson and Gantz, 1987, pp. 8, 11.

NOTES: Pact attacks NATO; 10 days Pact mobilization; 5 days NATO mobilization.

Numbers in changes columns indicate the number of armored division equivalents (ADEs) added (positive numbers) or removed (negative numbers) from the two sides' forces.

Combat outcomes are the average enemy penetration in kilometers into Western Europe after 30 days of conflict.

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